Telephony

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Mathematics For Telephone Engineers

HERE IS THE FIRST of a series on mathematics designed to enable the reader to handle alternating current problems, especially those relating to telephone transmission. Methods of calculation leading up to square and cube roots. Logarithms and their use

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THIS SERIES of articles is designed to enable the beginner to acquire a knowledge of the mathematical processes used in telephone transmission calculations. A working knowledge of some elementary sections of the subject is assumed, such as simple arithmetic and the four fundamental rules of algebra, addition, subtraction, multiplication and division. The following abbreviations are used throughout:

= is the sign for "equals" or "is equal to"
+ that for "plus"
− that for "minus"
× that for "multiplied by"
÷ that for "divided by"
∴ that for "therefore"
∵ that for "because"
> that for "greater than"
< that for "less than"
∝ that for "varies as"
∞ that for "infinity"
∠ that for "angle" (leading)
∠ that for "angle" (lagging)
$\sqrt{}$ that for "square root"
$\sqrt[n]{}$ that for "*n*th root"

2. *Approximate Calculation*

In telephone transmission work complicated numerical expressions are frequently encountered, the solution of which will be satisfied by approximate methods of calculation. Three or four-figure tables of logarithms, or the slide rule, are employed for such, but there are also some purely arithmetical labor-saving methods for dealing with them.

Take three numbers—107, 253, and 981. It will be seen that they may be written:

$(10 \times 10) + 7$,
$(2 \times 10 \times 10) + 53$, and
$(9 \times 10 \times 10) + 81$

Similarly, 1001, 1051, and 9981 can be written:

$(10 \times 10 \times 10) + 1$,
$(10 \times 10 \times 10) + 51$, and
$(10 \times 10 \times 10 \times 9) + 981$

The number of times that 10 enters as a factor into a number may be called the *grade* of that number. Thus the grade for

1 = 0
10 = 1
19 = 1
100 = 2
186 = 2
1000 = 3
9999 = 3
10,000 = 4 and so on.

From this it will be seen that the grade of a number is one less than the number of integers in that number, and it is possible to see by inspection the number of figures which will result either from division or multiplication of two numbers. Thus:

$100 \times 1000 = 100{,}000$

The grade of 100,000 = 5, which is equal to the sum of the grade of 100 and 1000; that is, 2 + 3 = 5.

When two numbers, such as 100, 1000, etc., are units of any grade, the grade of their product is equal to the sum of their grades.

This can be extended to division. For example: divide 24,000 by 240. The grades are 4 and 2 respectively. The answer (100) has a grade 2 and the grade of the quotient, therefore, is: grade of dividend minus grade of divisor. The last result can be used to obtain the grades of fractional numbers. Thus:

0.1 = 1/10 has a grade 0—1 = —1.
Similarly 0.01 = 100 and its grade is 0—2 = —2.

Thus it will be seen that the grade of a decimal number is one more than the number of ciphers following the decimal point and is negative.

0.1 has a grade —1
0.15 —1
0.01 —2
0.001 —3
0.0001 —4 and so on.

The two processes—multiplication and division—are thus governed by the following rules:

(a) In multiplying two numbers together, the sum of their grades will be the grade of the product:

(b) In dividing one number by another, the grade of the quotient will be the grade of the dividend less the grade of the divisor.

Examples: 255×3 and 240×8. The grades are 2 and 0 in both cases.

Now $255 \times 3 = 765$ and $240 \times 8 = 1920$, but the grades of the products are 2 and 3, respectively, although the sum of the grades is the same in both cases. It is apparent, therefore, that under certain circumstances 1 has to be added to the sum of the grades of the multiplier and the multiplicand in order that the grade of the product may be correctly ascertained.

If the first product is examined, it is seen that the leading digit 7 is higher than either 2 or 3, the leading digits of the multiplier and the multiplicand. When this is so, the grade of the product is equal to the sum of the grades. The number of figures in the result will, of course, be one more than the grade of the product.

The second product, 1920, has a leading digit lower than 2 or 8 as a result of the product overflowing into the next grade and this is an indication that the resulting grade will be the sum of the grades plus 1.

The rule previously given must, therefore, be modified to read:

> In multiplying two numbers together, the sum of their grades will give the grade of the product. When, however, the leading digit of the product is less than either that of the multiplier or the multiplicand, the grade of the product is the sum of the grades plus 1.

The rule for division also requires a corrective clause.

Example: Divide 24,000 by 100.

The grades are 4 and 2, the answer—240—having a grade 2. The rule as previously stated holds.

Divide 27,000 by 9,000.

The grades are 4 and 3 and the resultant grade $4 - 3 = 1$, but the grade of the answer, 3, is 0.

The rule must, therefore, be amended to read:

> To find the grade of the quotient, take the difference of grade of dividend and divisor, subtracting one from the result when the leading digits of the divisor are greater than those of the dividend.

A number multiplied by itself yields a product which is termed the *square* of that number. Thus:

10×10 is the square of 10 and is written 10^2, the small 2 at the top right hand of the cipher being variously named the *index* or *exponent*. $10 \times 10 \times 10$ or 10^3 is the *cube* of 10, and $10 \times 10 \times 10 \times 10 = 10^4$ the fourth *power* of 10, and so on.

10^1, 10^2, 10^3, are termed the first, second, and third powers of 10. Multiplying 10 by itself 1, 2, 3, ... n times is said to be "raising 10 to the 1st, 2nd, 3rd, and nth power.

$10 \times 10 = 10^2 = 100$, and 10 is said to be the *square root* of 100 or $10 = \sqrt{100}$.

10 is also equal to $\sqrt[3]{1000}$ or the cube root of 1000.

If 10^4 is multiplied by 10^2, the result is 1,000,000, or 10^6 as we have already seen.

By a few experiments the reader will see that $10^a \times 10^b = 10^{(a+b)}$ whatever the values of a and b.

Again $10^3/10^2 = 10^1$, $\therefore 10^a/10^b = 10^{(a-b)}$.

From the foregoing it follows that $10^{\frac{1}{2}} \times 10^{\frac{1}{2}} = 10^1$, $\therefore 10^{\frac{1}{2}}$ represents the square root of 10.

Similarly, $10^{\frac{1}{3}} \times 10^{\frac{1}{3}} \times 10^{\frac{1}{3}} = 10^{(\frac{1}{3}+\frac{1}{3}+\frac{1}{3})} = 10^1$, $\therefore 10^{\frac{1}{3}} = \sqrt[3]{10}$. The nth root of 10 is $10^{1/n}$

$10^2 \times 10^0 = 10^{2+0}$, $\therefore 10^2 \times 10^0 = 10^2$, and $10^0 = 1$

$10^{-2} \times 10^2 = 10^{2-2} = 10^0 = 1$

Therefore, $10^{-2} = 1/10^2$ and, generally, $1/10^n = 10^{-n}$.

These results may be used for the purpose of rapid, approximate calculation.

Example: 3567×1763

This can be written

$$3.567 \times 10^3 \times 1.763 \times 10^3$$

Approximation is introduced by further writing this

$3.57 \times 1.76 \times 10^6 = 6.28 \times 10^6$

The exact result is 6,480,000.

The great advantage of this method of procedure is that the most formidable looking expressions may be simplified in such a manner that the arithmetical work can be done either mentally or by mechanical aid, such as that afforded by a slide rule.

Example:

$$\begin{aligned} &9.763 \times 83.56 \times 0.087 \\ &= 9.76 \times 8.36 \times 8.7 \times 10^1 \times 10^{-2} \\ &= 710 \times 10^{-1} \\ &= 71 \end{aligned}$$

The exact result is 70.9864.

Where a slide rule is employed, some uncertainty may exist with regard to the position of the decimal point but this difficulty may be overcome by forming what may be termed a grade fraction alongside the numerical expression.

Taking the last expression as an example, the numerical expression is:

$$9.76 \times 8.36 \times 8.7$$

Write at the side a grade fraction which is formed of the positive powers of 10 divided by the negative powers.

In this example, the grade fraction would be ½. This is not 0.5 but is really $10^1/10^2 = 1/10$, the single power of 10 in the numerator cancelling one of the powers of 10 in the denominator.

The result will, therefore, be

$$9.76 \times 8.36 \times 8.7 \times 1/10$$

which is the same as was obtained before.

The advantage of employing the grade fraction comes in when dealing by means of the slide rule with such complicated expressions as:

$$\frac{0.1679 \times 0.0002 \times 86 \times 3{,}845}{47{,}500 \times 0.008}$$

This simplifies to:

$$\frac{1.679 \times 2 \times 8.6 \times 3.84}{4.75 \times 8}$$

while the grade fraction is:

$$\frac{4+3}{5+4} = \frac{7}{9} = 7 - 9 = -2$$

The arithmetical result is 2.9 and, as the grade is —2, the final result is 0.029.

It should be noted that where negative powers of 10 occur in the numerator of the arithmetical expression, they are placed in the denominator of the grade fraction; and where they occur in the denominator of the numerical fraction, they are placed in the numerator of the grade fraction. A little reflection will show the student the necessity for this.

Dealing successfully with such expressions as are given in this article is a matter of practice, but the earnest student who either manufactures examples for himself or takes them from some arithmetic book will rapidly attain speed and precision.

3. *Approximate Method of Obtaining Square and Cube Roots*

Remembering that the square root of 100 or 10^2 is 10, of 10^4 is 10^2, of 10^6 is 10^3 and so on, the following is a method of finding the square root of a number. Examples:

(a) Find the square root of 496.7.
Writing this 4.967×10^2, the answer is: $10 \times \sqrt{4.967} = 22.3$

(b) $\sqrt{4976}$
$4976 = 49.76 \times 10^2$ and its square root will be:
$10 \times \sqrt{49.76} = 70.5$

(c) Find the cube root of 200.
$200 = 2 \times 10^2$
$\sqrt[3]{200} = \sqrt[3]{2} \times 4.642$
(4.642 being the cube root of 100)
$= 5.849$

(d) $\sqrt[3]{30} = \sqrt[3]{3} \times \sqrt[3]{10}$
$= 1.442 \times 2.154$
$= 3.106$

(e) $\sqrt[3]{0.000343} = \sqrt[3]{343} \times 10^{-6}$
$= \sqrt[3]{343} \times 10^{-2}$
$= \sqrt[3]{3.43} \times 4.642 \times 10^{-2}$
$= 1.51 \times 4.642 \times 10^{-2}$
$= 0.07$

The foregoing methods depend upon the fact that

$$(1 \times 2 \times 3 \times \ldots\text{.etc.})^n = 1^2 \times 2^2 \times 3^2 \times \ldots\text{.etc.}$$

where n is 2 or 3.

The process can be described as resolving a number into factors, preferably containing powers of 10, when the square or cube root of the number will be equal to the product of the square or cube roots of the

factors. The method yields exact results and the approximation is introduced by writing a number, such as 496.7 as 497, 4976 as 4980 and so on. It is obvious that the method could be extended to the extraction of higher roots than the cube but there are other, more satisfactory, ways of dealing with these.

In such calculations as those of the present article, it is useful to have curves giving the square and cube roots of the numbers 1 to 10, so that the roots of intermediate numbers can be read off without calculation. Such curves are given in Fig. 1.

The examples may be concluded by working out that given below.

$$\sqrt{\frac{25.37 \times 0.086}{0.179 \times 3709}}$$

Leaving the operation of the extraction of the square root to the last, write the expression under the radical as below, forming at the same time the grade fraction. Thus:

$$\frac{2.537 \times 8.6}{1.79 \times 3.709} \quad \frac{1+1}{2+3} = 2\text{—}5 = \text{—}3$$

The expression reduces to 3.2, and the grade fraction indicates that this must be multiplied by 10^{-3}.

The final result is thus 0.0032.

Writing this: $\sqrt{32} \times 10^{-4}$ the result is $5.657 \times 10^{-2} = 0.0566$ approximately.

4. *Logarithmic Calculation*

A	1	2	3	4	5	6	7	8	9	10
B	2	4	8	16	32	64	128	256	512	1024

In the two series above, series A increases or diminishes by a constant *difference* (1). Series B increases or diminishes by a constant *factor* (2). The first is an *arithmetical*, and the second a *geometrical* progression.

From the series B, a third series may be formed:

C $1\ 2^1\ 2^2\ 2^3\ 2^4\ 2^5\ 2^6\ 2^7\ 2^8\ 2^9\ 2^{10}$

the first term of which is $2^0 = 1$.

The terms in series A represent the power to which 2 has been raised to produce the terms of series B.

Thus, 4 in series A stands above 16 in series B and $16 = 2^4$.

It is possible to multiply together any two numbers in B by adding the figures in series A standing over the two factors in B. Under the number corresponding to the summation in A will be found the product of the two numbers selected from B.

Thus, consider 16×32

A	4	5	9
B	16	32	512

From the foregoing table the figures 4 and 5 in series A correspond to the numbers 16 and 32 in B. $4 + 5 = 9$ and under 9 in series A is found the product, 512, of 16×32.

Division requires that the corresponding terms in series A be subtracted when the answer will be found under the number in A corresponding to this difference.

Example: Divide 128 by 4.

A	2	5	7
B	4	32	128

The corresponding terms in A are 7 and 2; their difference 5; and under 5 in A is the answer, 32, in B.

The square, cube, or nth root of a number can also be obtained by means of the two series.

Required $\sqrt{256}$ and $\sqrt[3]{64}$.

A	2	4	6	8
B	4	16	64	256

Over 256 in B is 8 in A. Now it has been shown in the previous section that the square root of $X^8 = X^{8/2}$; therefore the square root of 256 $= 2^8$ will be $2^{8/2} = 2^4 = 16$.

The process for the extraction of the square root is, therefore, to take the figure in series A over the number whose square root is required, divide this by 2, and under the quotient so obtained in A to read the answer in B.

8A corresponds to 256B, and 8/2 $= 4$. Under 4A is found 16 B, and this is $\sqrt{256}$.

The cube root of $x^3 = x^{3/3}$, so that for the extraction of the cube root, the relevant number in A is divided by 3, and the answer found in B as before.

Over 64B is 6A and $6/3 = 2$. Under 2A is 4B, the cube root of 64. To obtain the fourth, fifth, or nth roots of a number, divide the arithmetical term of that number in A by 3, 4, 5, or n and proceed as before.

The process of raising a number to any desired power will be fairly obvious.

$$x^3 \times x^3 = x^{2\cdot3} = (x^3)^2$$

Similarly,

$x^3 \times x^3$ to n times $= x^{n3}$.

Taking 8^3 and 16^2.

A	3	4		8	9
B	8	16		256	512

Above 8B read 3A. $3 \times 3 = 9$ and under 9A read $(8)^3 = 512$ B.

Above 16B read 4A. $4 \times 2 = 8$ and under 8A is 256 B $= 16^2$.

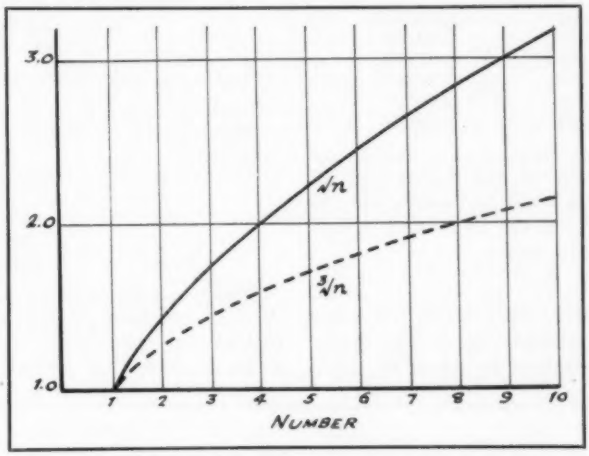


Fig. 1. Curves By Means of Which Square and Cube Roots of Numbers Up to 10 Can Be Obtained Without Calculation.

It is seen from the foregoing that the arithmetical operations of *multiplication* and *division* become *addition* and *subtraction* and that *involution*, or the raising of a number to any power, is effected by multiplying two numbers together, while *evolution*, or the extraction of the square, cube, or *n*th root, become division.

The numbers in series A are called the logarithms of those in series B as they indicate the ratio of the number of times the common factor enters any term in the geometrical series. The common factor 2 is said to be the *base* of the system of logarithms.

The system of logarithms in common use has 10 as its base and the table takes the form below.

A	0	1	2	3	4
B	1	10	100	1000	10000
C	10^0	10^1	10^2	10^3	10^4

The logarithm of a number between 1 and 10 lies between 0 and 1 and of 10 and 100 between 1 and 2 and so on. Now

$1 = 10^0$, $\therefore \log_{10} 1 = 0$
$10 = 10^1$, $\therefore \log_{10} 10 = 1$
$0.1 = 10^{-1}$, $\therefore \log_{10} 0.1 = \text{—}1$
$0.01 = 10^{-2}$, $\therefore \log_{10} 0.01 = \text{—}2$ and so on.

$\text{Log}_{10} N = x$, is read "the logarithm of N to the base 10 is x." Logarithms of numbers between 1 and 10 may be obtained by successive extractions of the square root of 10. Thus

$10^{\frac{1}{2}} = 3.1623$; $\therefore$ ½ or 0.5 is the logarithm of 3.1623 to the base 10.

$\sqrt{3.1623} = 10^{\frac{1}{4}} = 1.7783$; $\therefore$ $0.25 = \log_{10} 1.7783$

$\sqrt{1.7783} = 10^{\frac{1}{8}} = 1.3336$; $\therefore$ $0.125 = \log_{10} 1.3336$

In this way the following table is constructed:

Number	Logarithm
1.0746	0.03125
1.1548	0.06250
1.3336	0.12500
1.7783	0.25000
3.1623	0.50000

This table requires completion by the insertion of the logarithms of the numbers lying between 3 and 10.

Referring to the two series A and B reproduced below,

A 1 2 3 4 5 6 7 8 9 10

B 2 4 8 16 32 64 128 256 512 1024

it will be noticed that if any three adjacent numbers in series B—such as 4, 8, and 16—be taken, the same proportion which exists between 4 and 8 also exists between 8 and 16. Thus

$4/8 = 8/16$ or, multiplying across, $4 \times 16 = 8 \times 8$.

The middle term, 8, is said to be the *mean* proportional of the series 4, 8, 16. If any three adjacent terms in series A be taken, such as 2, 3, 4, the middle term is the *mean* term, being half the sum of the extremes.

By taking the numbers and their logarithms so far obtained and utilizing the principles outlined, it is possible to calculate the logarithms of the numbers lying between 3.1623 and 10. Thus, the logarithm of 3.1623 is 0.5 and that of 10 is 1. The logarithm of the mean proportional, x, is 0.75. Also,

$3.1623/x = x/10$ or $31.623 = x^2$.

x is thus $\sqrt{31.623} = 5.621$, which is the number whose logarithm is 0.75.

In the same way the mean of 1.00 and 0.75 is 0.875 and

$5.621/x = x/10$ or,

$x = \sqrt{56.21}$

$= 7.49$.

Again, the mean between 0.875 and 1.0 is 0.9375 and $\sqrt{74.9} = 8.65$.

These results with others are tabulated below.

Number	Logarithm
5.621	0.7500
7.490	0.8750
8.650	0.9375
9.300	0.9687

These values, together with those of the previous table, should be plotted in the form of a curve (Fig. 2) and, if a reasonably large scale is adopted, the logarithm of any intermediate number can be read at once with fair accuracy.

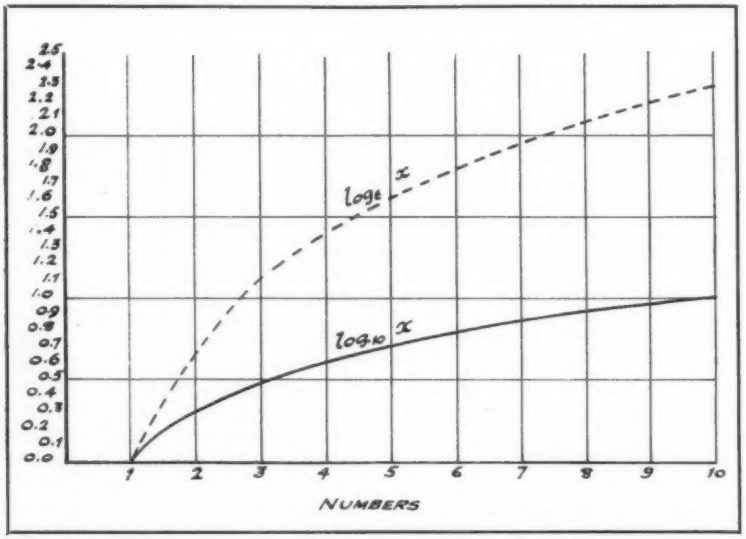


Fig. 2. Curves By Means of Which Logarithms of Intermediate Numbers Between 1 and 10 May Be Read at Once With Fair Accuracy.

Logarithms of numbers containing one or more powers of 10, positive or negative, have integral as well as fractional parts. Thus

log. $2 = 0.3010$
log. $20 = 1.3010$
log. $200 = 2.3010$
log. $0.2 = \bar{1}.3010$
log. $0.002 = \bar{2}.3010$ and so on.

Note that the bar over the characteristics indicates that they are negative in sign. The decimal portion of the log is, however, positive.

$\bar{2}.3010 = -2 + .3010 = -1.6990$.

The *index* or *characteristic* is identical with what has previously been termed the *grade* of a number.

Generally, $\log (A \times B) = \log A + \log B$, or the log of a product is equal to the sum of the logs of the factors.

$\text{Log } A/B = \log A - \log B$. The log of a quotient is equal to the difference of the logs of the numerator and denominator.

$\text{Log } A^n = n \log A$. The log of a number raised to a power is equal to the log of the number multiplied by the power.

The nth root of $A = A^{1/n}$ and its logarithm $= 1/n \log A$.

Most tables of logarithms include instructions for their use, but a few examples of calculations made with the aid of logarithms are given below.

(a) Multiply 5623 by 1547.
From tables, the decimal portion is 0.7499. Its characteristic is 3; therefore,

log 5623 = 3.7499
Similarly log 1547 = 3.1895

Adding 6.9394

From a table of anti-logs, log 0.9394 is found to be the log of 8.693 and the answer is, therefore, 8.693×10^6.

(b) 0.000168×0.003

log 0.000168 = $\bar{4}.2253$
log 0.003 = $\bar{3}.4771$

adding $\bar{7}.7024$

The anti-log of 0.7024 is
$5.04 \times 10^{-7} = 0.000000504$

(c) $(3931)^2$

log 3931 = 3.5945
Multiplying by 2 = 7.189
The anti-log of 7.189 is
$1.545 \times 10^7 = 15{,}450{,}000$.

(d) Cube 3931
log 3931 × 3 = 10.7835
the anti-log = 6.074×10^{10}.

(e) Divide 0.000168 by 0.003
The log of 0.003 must be subtracted from that of 0.000168.

$\bar{4}.2253$
$\bar{3}.4771$

$\bar{2}.7482$

It will be noted that in subtracting the decimal portions of the two logs, 1 had to be borrowed to effect the subtraction of 4 from 2. This 1, which is carried from the subtraction, is positive and the resultant characteristic is, therefore

$\bar{4} - (\bar{3} + 1) = \bar{4} - \bar{2}$
$= \bar{2}$

The anti-log of $\bar{2}.7482$ is
5.601×10^{-2}.

(f) $\sqrt{3931}$

log. 3931 = 3.5945
3.5945/2 = 1.7972
anti-log = 6.269×10^{1}

(g) Find the reciprocal of 3931

log 1/3931 = 0—3.5945
= $\bar{4}.4055$
anti-log = 2.544×10^{-4}
= 0.0002544.

(h) $\sqrt{0.8633}$

log 0.8633 = $\bar{1}.9377$

Now we cannot divide $\bar{1}.9377$ by 2 because the characteristic is negative while the decimal portion is positive. The division can be performed, however, by adding —1 to the characteristic and +1 to the decimal portion, thus permitting each portion to be divided separarately. Thus:

$(-2 + 1.9737)/2 = \bar{1}.9688$

The anti-log of this is 9.307×10^{-1}

$\sqrt{0.8663} = 0.9307$

Another method for dealing with such a logarithm as $\bar{1}.9377$, when it has to be divided by 1, 2, 3, or n, is to write it as —0.0623. Then, dividing by 2, 3, or n, it becomes (in the case of divisor 2)

—0.03115 or $\bar{1}.9688$ as before.

(1) Extract the cube root of 0.8663

log 0.8663 = $\bar{1}.9377$

Writing this as —0.0623, and dividing it by three, the result is 0.02076 or $\bar{1}.9792$, the anti-log of which is

$9.532 \times 10^{-1} = 0.9532$.

Finally, extract the cube root of

$$\frac{29.6 \times 0.1234}{9176 \times 0.087}$$

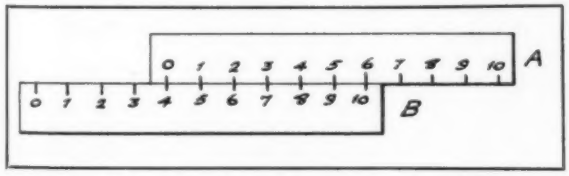


Fig. 3. Simple Mechanical Device for Doing Addition and Subtraction.

The work is set out in steps.

1. log 29.6 = 1.4713
2. log 0.1234 = $\bar{1}.0913$
3. adding 0.5626
4. log 9176 = 3.9627
5. log 0.087 = $\bar{2}.9395$
6. adding 2.9022
7. subtract (6) from (3)
   0.5626
   2.9022
   $\bar{3}.6604$
8. $\bar{3}.6604/3 = \bar{1}.2201$, the anti log of which is 1.66×10^{-1}.

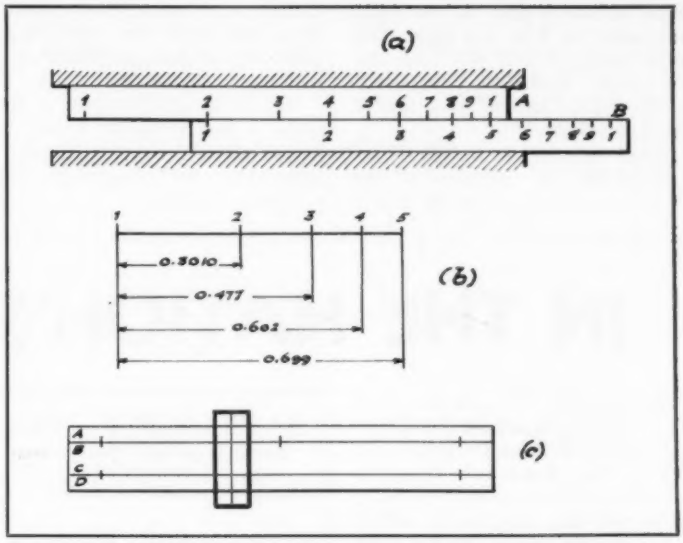


Fig. 4. The Slide Rule for Multiplication and Division With Scale Divisions Corresponding to Logarithms of the Number.

The student will find it instructive to make a series of calculations with four-figure logs and then with seven-figure logs and note the difference in the results.

5. *Hyperbolic Logarithms*

There is another system of logarithms widely used in transmission calculations and known variously as *Napierian*, *hyperbolic*, and *natural* logarithms. The latter term is applied to this system because it arises naturally from the expansion of an expression in a power series.

The base of this system is the number 2.7183 . . . ., etc., and it is usually represented by the Greek letter ϵ. In scientific work, unless otherwise specified, hyperbolic logarithms are implied in any expression containing a logarithmic term.

It is easy to find the relationship between this and the common system of logarithms. Thus:

$\sqrt{2.7183\ldots} = 2.7183^{\frac{1}{2}} = 1.648$

Therefore, $0.5 = \log_{\epsilon} 1.648$

The common log of 1.648 is 0.2169

Therefore,
the hyp. log = 0.5/0.2169
= 2.303 times the common log of a number.

The dotted curve in Fig. 2 gives the hyperbolic logs of the numbers 1 to 10.

6. *The Slide Rule*

Addition and subtraction can be carried out by mechanical means. Thus, in Fig. 3, two strips, A and B —of which B is fixed and A capable of sliding motion along B—are graduated with the figures 0 to 10 evenly spaced.

The operation of the device will be fairly obvious. To add 6 to 4, set 0 on A to 4 on B, and opposite 6 on A will be found the answer, 10. Again, to subtract 6 from 10, set 6 on A to 10 on B, and under 0 on A is 10 — 6 = 4.

If the subdivisions were logarithmic, the slider and the fixed scales would appear as in Fig. 4-a, and the addition or subtraction processes would then represent multiplication and division. The rule is shown as being set for multiplying 2 by 4. This is accomplished by setting 1 of B to 2 on A and over 4 of B reading the answer, 8, on A.

To divide, say, 6 by 3, set 3 of B under 6 of A, when the answer 2 will be found over 1 on B.

The divisions 2, 3, 4, etc., represent distances to some scale corresponding to the logarithms of these numbers (see Fig. 4-b).

The practical slide rule has four scales, A, B, C, and D, B and C being on the slide and A and D on the body of the rule. A slider, C, consisting of a small, aluminum frame embracing the four scales and provided with a transparent window with a hair line marked on it, is used to read corresponding points on scales A and B and on scales C and D.

The distances between 1 and 2, 2, 3, etc., on scales C and D are twice

those on scales A and B, the logarithmic scale of Fig. 4-a appearing twice on scales A and B. The two upper scales, therefore, represent twice the logarithms of the figures on the lower scales.

Numbers on scales A and B, therefore, represent the squares of the numbers opposite to them on scales C and D. Numbers on scales C and D, consequently, represent the square roots of numbers on scales A and B which are opposite to them.

The slide rule is really a portable table of logarithms in which the distances along the scales represent the logarithms, and the graduations the anti-logarithms.

With a slide rule and the methods of calculation outlined in this section, much of the calculations required in transmission work can be effected with the required degree of accuracy.

The student should remember that facility and accuracy in the art of calculation is only attained, as in other arts, by practice.

IN THE NATION'S CAPITAL

By FRANCIS X. WELCH,
Special Washington Correspondent for TELEPHONY

ONE ECONOMIC factor that continues to amaze Washington, as well as to warm the cockles of the heart of the New Deal, is the tremendous strides daily reported for the telephone industry. Of course, we all know that business is improving and it has been weeks since even the most pessimistic observers have suggested that we may not be out of the depression. Nevertheless, few experts —even inside of the industry—expected the telephone business to step out ahead of the recovery parade in such an emphatic fashion.

Only last January this correspondent, for example, made what he thought was an optimistic suggestion to the effect that the Bell System might resume the earning of its full dividend rate sooner than company reports to its shareholders would indicate.

It did not seem possible, however, that such a recovery could be made in less than two years. Yet only last week the generally respected Standard Statistics stated bluntly: "Attainment of a rate of earnings fully covering the $9 (A. T. & T.) dividend within the next year or so is now indicated."

It is needless to report here the operating statistics concerning reconnections and new business that form the basis for such an optimistic outlook. TELEPHONY readers are doubtless familiar, at least in a general way, with the figures that tell the story. Interesting, however, is the fact that this could possibly be so notwithstanding the continuous pressure for telephone rate reductions in many sections of the country and the continuous hammering here in Washington by the FCC special investigation.

The present outlook would indicate that the special investigation has had so far no detrimental effect on the industry as a whole, and that even the numerous local rate situations are not threatening enough to cloud the picture. What makes this state of affairs particularly agreeable to the New Deal is that recovery of the telephone industry is steadily being recognized as an accurate symptom of national economic good health.

OVER in the National Press Building sits Emil Hurja, right-hand assistant to Postmaster General James A. Farley. As we all know, the practical job of re-electing President Roosevelt is up to Postmaster Farley in general and Mr. Hurja in particular. Mr. Hurja is the All-American Pulse Feeler No. 1. At his command are numerous maps, charts, graphs and indexes that are supposed to tell Mr. Hurja right now what the Literary Digest poll will tell the rest of us next Fall.

Needless to say, the factor of economic recovery plays an important part in Mr. Hurja's calculations. It is like the pressure gauge on a steam boiler. He watches it constantly and in these observations a principal part is played by telephone installations.

Why? Well, if you asked Mr. Hurja he would frankly tell you that of all the so-called "indexes" none comes so close to the home of the American voter as the telephone. Carloadings, steel production, electric power output—these are all very helpful, he says, but they do not quite tell the complete story that Mr. Hurja wants to know.

An electric power rise means that factories are producing. Carloadings mean that orders are coming in for the goods produced, but the new telephone means that recovery has reached the home. It means a better satisfied citizen. It means that "little business"—the small-capital type of investment so necessary to our economic health—is beginning to get up nerve and come out of its hole.

Of course, Mr. Hurja's conclusions may be wrong. These very satisfied citizens may vote Republican next fall. But there is little doubt about the facts upon which such conclusions are based. The total number of Bell System telephones in use increased to 13.8 million at the close of the year, a gain of 3.5 per cent over the year before and within 11 per cent of the peak of 1930.

IN THIS bright picture there is one cloud that looms bigger than possible rate cuts or the Federal investigation—that is taxes. A recent report reached Washington during an argument in the Senate Finance Committee over the amount of Federal and state taxes that the telephone industry has to pay. To be specific, the report was that of the Southern Bell Telephone & Telegraph Co., which operates in nine states in the South.

This one company, it appears now pays annual taxes in the state of Mississippi alone amounting to $8.10 per telephone. In other states the taxes per telephone were: South Carolina, $8.01; Louisiana, $7.43; North Carolina, $7.72; Kentucky, $5.58; Alabama, $5.48; Florida, $4.62; Tennessee, $4.37; Georgia, $3.72. Federal taxes average from 15 to 20 per cent more. Thus in North Carolina the combined state and Federal tax per telephone averaged $9.08.

In spite of such tax figures, the telephone industry is faced with yet higher taxes and demands for lower rates. They resemble upper and lower grindstones that will make the industry work hard for its profits. The day may even come when increased telephone business will indicate more proportionate re-

covery for the general economic system than it does for the telephone companies.

IT IS BEGINNING to get hot in Washington. Already the city is getting the benefit of a blazing sun for which it has become so noted that Lord Bryce once declared it to be the worst situated capital city in the world. It won't be long now before the local city editors start the old dodge of sending photographers out to take a picture of Representative Whoozis frying eggs on the Capitol steps, and so forth.

Naturally, in such weather the thoughts of those of us who work in the government and those of us who merely try to keep up with the work of the government turn to cool beaches, shady mountain trout streams—in a word, vacation. Despite Washington's semi-tropical reputation, all this may strike some readers as premature, but it is necessary to plan such matters considerably in advance.

However, summer vacation is one common ground upon which diverse as well as adverse interests can meet and often do. Lawyers who practice before the Federal Communications Commission are forming a bar association of their own. In the course of this commendable movement, some of the lawyers thought it would be fine if the commission had a summer recess.

Contact was made with the legal department of the commission and it developed that some of the government attorneys had been thinking along similar lines. And so, as a result, an informal agreement was worked out whereby the commission will hold no hearings in full or in part during the months of July and August, except in cases of extreme urgency. This will probably mean that matters usually falling due during these two months will be recessed until September or later.

The hearing scheduled for July 6 in the Poteau (Okla) case of the Oklahoma-Arkansas Telephone Co. against the Southwestern Bell Telephone Co. already has been changed to October 5.

Your correspondent was unable to get any absolutely certain information as to whether this recess will apply to the special Bell investigation, but he feels that it is more likely than not that the investigation likewise will stop around July 4 and commence again around Labor Day. The hearings, scheduled for June 2, were resumed on May 25 and will probably run quite steadily through the month of June.

Don't expect any official commission ruling on this. It is just an informal agreement and, therefore, subject to change without notice. During the interim, of course, the commission's time will be well taken up with the completion of reports in cases already heard, the routine checking of material to be used later, and the taking of annual leave earned by the personnel.

SPEAKING of taxes, the Senate finance committee's version of the new tax bill, which appears at this writing to be the form most likely to predominate in the final enactment, is not nearly as hard on telephone companies as the original Treasury proposals. True, the Senate bill increases by about 20 per cent the Federal corporate income tax on all companies making more than $10,000 a year, even assuming that they distribute every nickel of the earnings to stockholders.

COMING CONVENTIONS

Pennsylvania State Telephone & Traffic Association Penn-Harris Hotel, Harrisburg, June 11, 12, and 13.

Washington Independent Telephone Association, Ellensburg, June 12 and 13.

The Illinois Telephone Association, Pere Marquette Hotel, Peoria, September 17 and 18.

This is even true (although the amount of the increase would be smaller) as to corporations earning as little as $2,500, which would include some of the smaller Independent telephone companies. However, a $1,000 exemption from both the regular 18 per cent Federal income tax and the flat 7 per cent penalty tax on retained earnings in the business, allowed for all corporations earning less than $20,000 a year, will be a big help to the smaller companies.

Summing up the new features of the Senate bill as affecting the telephone companies, there are three points to remember:

1. A corporate income tax of 18 per cent.

2. A flat penalty tax of 7 per cent on all undistributed earnings.

3. An exemption of $1,000 on income for purposes of both the foregoing taxes (1 and 2) for corporations earning less than $20,000 a year.

Of course, dividends received by stockholders are subject to individual income tax as before and the old capital stock and excess profit taxes are retained.

Some idea of how the bigger corporations will be affected by the new bill can be seen in its application to the 1935 operations of the American Telephone & Telegraph Co. In that year the company's net income was $137,794,782. Under the new schedule its income tax would increase $4,686,000, but it would escape the 7 per cent tax on undistributed earnings because the company is not only paying out all current earnings, but dipping into reserves. In 1935 it paid out 25 per cent more than it earned.

For the immediate future, therefore, A. T. & T. will escape the 7 per cent tax because of its policy of keeping up dividends. This also holds for its subsidiaries for the same reason. Contrast this, however, with other companies having a different policy, such as the Pennsylvania Railroad Co., which last year distributed only 55 per cent of its income in dividends. If Pennsy does this again for 1936, it will be soaked more than $750,000 on the undistributed earnings, assuming that its income is approximately the same for the two years.

However, it must be remembered that the only thing which made A. T. & T. dividends possible throughout the depression was the reserve accumulated prior to 1930. When the Bell tries to replenish its reserve it, too, will pay tribute to Uncle Sam for its thrift. The reserve will, in consequence, increase more slowly.

Who said it pays to be thrifty? The new slogan is: "A penny saved is a penny taxed." And it might be well to advise the children hereafter not to take too seriously that old story about the grasshopper and the ant.

▼ ▼

Increase in Number of Telephones in Great Britain

The British Postmaster General announced on April 24, that in the 18 months following the introduction of the reduced rates for trunk calls in October, 1934, there had been an increase of 302,000 telephones in Great Britain. During the six months preceding March 31, 1936, a total of 48,800,000 trunk calls were recorded. This is at an estimated rate of over 97,000,000 trunk calls per year compared with the actual total of 86,000,000 in 1934-35.

Fine Convention at Mitchell, S. D.

THE RECENT one-day convention of the South Dakota Telephone Association was characterized by an interesting program and well-attended sessions

AN INTERESTING program and well-attended sessions combined to make this year's one-day convention of the South Dakota Telephone Association a good one. It was held in Mitchell on May 14. F. E. Wheeler, of Scotland, president of the Peoples Telephone Co., was re-elected president for the ensuing year; Ira S. Burnett, of Armour, and W. W. Straight, of Crooks, were elected vice-presidents; and Thos. Phalen, of Aberdeen, was re-elected secretary-treasurer.

Mr. Straight, manager of the Crooks Telephone Co.; Mr. Burnett, secretary-manager of the Armour Telephone Co.; and Mr. Wheeler were all re-elected to the board of directors. Gust Quast, of Menno, manager of the Menno Telephone Exchange, was appointed to the board of directors to fill the unexpired term of P. F. Orcutt, of Custer, who has moved away from the state.

The convention was called to order by President Wheeler at 10:45 a. m. on Thursday, May 14. On motion duly approved, the reading of the minutes of the previous convention was dispensed with because members were furnished with a copy of a reprint of the convention story printed in TELEPHONY of June 15, 1935.

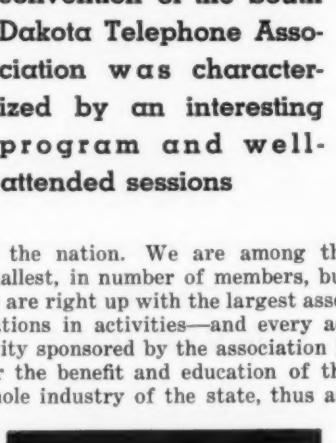
The secretary read the financial report and also the minutes of the meetings of the board of directors since the last convention. On motion, both reports were duly approved and ordered placed on file.

Mayor George Fredericks, of Mitchell, was introduced. During his remarks, he complimented the telephone companies for the fine service they provided under adverse conditions. He added that telephone companies were handicapped by increasing operating expenses but kept on the job furnishing good service, which is a benefit to the public whether the companies' efforts were appreciated or not.

The local company, the mayor stated, was requesting that the city of Mitchell grant it a franchise. So far as he could observe, he was sure that a franchise would be granted at the election. He further stated that the city commission, as well as himself, was for a franchise, 100 per cent.

When the mayor finished his remarks, President Wheeler gave his annual address. He said, in part:

"The records indicate that we have one of the best telephone associations in the nation. We are among the smallest, in number of members, but we are right up with the largest associations in activities—and every activity sponsored by the association is for the benefit and education of the whole industry of the state, thus assisting non-member companies as well as member telephone companies.



THOS. PHALEN, of Aberdeen, Has Served as Secretary-Treasurer of the South Dakota Telephone Association for Many Years and Was Recently Re-elected to Office.

The South Dakota Telephone Association is your association. The constitution and by-laws provide a very democratic organization and no member telephone company, large or small, can dominate. Our large member companies are always glad to assist the officers of our association in solving any big problem that presents itself at any time they are invited to do so.

It is appalling to note from the records that there are so many telephone companies in the state which should be association members and which are not. This situation indicates that member companies (comparatively few in number as against the total number of telephone companies in the state) carry on the activities and financial burdens, while many companies sit back and take advantage of the benefits which the association is able to secure for the entire industry in the state.

We have an association which provides means of representation before federal and state legislative and regulatory bodies (that are not, in many instances, familiar with our business) who may impose burdens on the industry unwittingly. By this I mean that if these various bodies were thoroughly familiar with the business, they would not impose legislative or regulatory burdens that would have a serious effect on our business.

It has been the practice of the association to be represented before these bodies whenever there is any question as to the effect proposed legislative or regulatory matters would have on the telephone industry.

As a rule, I find that federal and state regulatory bodies do not impose burdens if they find it seriously affects the business. In many cases association representatives before these bodies were able to properly discuss the effects measured so that unfavorable ones were not passed. Of course, it is true that we are unable to forestall many measures now in effect which affected our business, but we have done our duty and I believe we have abided by legislative and regulatory measures after they were passed. However, if we found that the measure imposed was unconstitutional and would confiscate our business, we resorted to the courts.

During the past few years our activities slowed up somewhat, but we were always on the job whenever necessary."

President Wheeler then appointed the following committees:

Nominating committee: H. M. Schumacher, F. H. McGinnis and I. S. Burnett.

Resolutions committee: F. H. Erdman, Charles E. Robinson and Robert W. Aszmus.

The next on the program was A. A. Little, transmission supervisor, Dakota Central Telephone Co., Aberdeen. He gave a very instructive address on inductive interference between communication lines and power lines. He devoted his attention largely to inductive coordination.

The factors causing noise were divided under three general headings:

power system influence, telephone circuit susceptance and coupling. Under these general headings were grouped such factors as wave shape and method of operation of the power system, the type and method of operation of telephone lines, station and central office equipment, and the length and separation involved in a parallel.

Mr. Little discussed the relative importance of each of these factors, giving the reasons why each is important from a noise standpoint and discussing methods of control which could be applied to reduce the resulting amount of noise. Particular attention was given to the amount of noise reduction which could be expected by transpositions in the power and telephone circuits; by maintaining an adequate balance on the power system, both as to load distribution and line mileage distribution between the three phases; and by maintaining a proper balance to ground on the telephone lines.

J. C. Crowley, Jr., of St. Paul, Minn., secretary of the Minnesota Telephone Association; Charles E. Adams, general manager, Groton-Ferney Telephone Co.; R. W. Aszmus, manager, Stickney Telephone Exchange; and W. R. Johnson, general commercial manager, Northwestern Bell Telephone Co. of the Nebraska-South Dakota area, took part in a very interesting and educational discussion.

The discussion brought out conditions which telephone companies must be prepared to meet in the event of rural electrification — the problems caused by inductive interference on account of parallels. Even though the extension of power lines in rural territory in the state of South Dakota may be somewhat remote, because of the sparsley-settled territory, the fact still remains that its neighboring states — Minnesota, Iowa and Nebraska—are now confronted in certain vicinities with the problems that rural electrification will bring about.

All angles of the situation were thoroughly discussed, both from an operating standpoint and a financial standpoint, including the cost of changing the class of service of rural telephone lines which are mostly grounded lines.

After this discussion, the convention was adjourned for luncheon.

After luncheon, Carl Ralston, secretary of the Mitchell Chamber of Commerce, was introduced. Mr. Ralston said he hoped that the telephone association would convene at Mitchell every year and wanted its members to feel that they were very welcome.

After Mr. Ralston's talk, C. R. Hicks, manager of the Dakota Central Telephone Co. at Mitchell, presented two reels of moving pictures. The first was "Broadcasting Network" and the other "Getting Together." Both films were very interesting and much enjoyed by those present.

The convention reconvened at 1:45 after which the resolutions committee reported. The resolutions extended thanks to the various speakers for their part on the program; to the association officers for their work on behalf of member companies; and to George Phifer, C. R. Hicks and other employes of the Dakota Central Telephone Co. at Mitchell for their efforts and assistance in making the convention a success.

IRA S. BURNETT, of Armour, Was Re-elected a Vice-President of the South Dakota Telephone Association at Its Recent Convention in Mitchell.

The nominating committee's report recommended that the board of directors whose terms expired be re-elected. Therefore, on vote, F. E. Wheeler, I. S. Burnett, W. W. Straight were re-elected to serve on the board of directors for a term of three years, as has been previously given.

J. C. Crowley, Jr., secretary, Minnesota Telephone Association, was introduced and spoke on "Our Tax Problems." Mr. Crowley said that he could not refrain from speaking about the successful endeavors of the late J. L. W. Zietlow and some of the things he advanced regarding the telephone business. Not only the state but the nation owed him homage for the ideas that he advanced. He had a great deal to do with the introduction of the bridging telephone which is in general use today on party lines.

Not being a tax expert, Mr. Crowley stated, he could not give the "low-down" on taxation, but he would talk about the effect from a cost standpoint. From time to time in the last few years, Mr. Crowley stated, that our state and national law-making bodies have given us some new taxes to think about such as the excise tax, old-age pension tax, social security tax, etc. The effect these taxes would have on telephone property during the next few years was discussed by the speaker.

The automobile brought about additional telephone operating costs, because it was necessary to move poles to new locations in order to widen and build roads to accommodate the automobile. This, he said, brought about very heavy burdens on telephone companies. Then it became necessary for the companies to operate motor equipment—and the gasoline tax was added to the cost of operating motor equipment.

Mr. Crowley stated that Secretary Frank McKinney, of the Ohio Independent Telephone Association stated in his address at the Iowa convention, that the telephone companies are now paying 96 different kinds of taxes. Therefore, the taxation problems from a cost standpoint should be very interesting to telephone companies. Such increasing costs caused by increasing taxation and the increase in labor and material costs and other expenses as compared with the time that rates were established for telephone service, should have a trend toward increasing the cost of telephone service to the customer. Unless rates are increased, Mr. Crowley said, he can not see how telephone companies can continue to operate.

The next speaker was Stanley Brekhus, accountant for the South Dakota Board of Railroad Commissioners. Mr. Brekhus stated that the commission had some difficulty in securing reports properly made up from telephone companies. He recommended to the commission that he be allowed to visit some of the companies to assist them in setting up their books so that proper and correct reports could be made, but on account of the commission's appropriation being reduced to the very limit the commission was unable to authorize him to carry out his suggestion.

At the close of Mr. Brekhus's address, there was some discussion of miscellaneous topics after which the convention adjourned.

Independent Takes Over Bell At Council Grove, Kans.

COMPETITION in Morris county, Kansas, is a thing of the past. After more than two decades of strife and competition, the Council Grove Mutual Telephone Co. early this year consummated negotiations for the purchase of the local properties of the Southwestern Bell Telephone Co., and at midnight, March 20, the merger of the dual plants in the county-seat town of Council Grove was effected.

The surviving company, which prior to the merger was serving about 500 subscribers, is making arrangements to convert its exchange to common battery. By January 1, 1937, it expects to have a modern telephone system from which every telephone subscriber in the county will have connections with the county-seat exchange without payment of a toll charge. Long distance connections will be made over lines of the Bell company.

Much credit for the successful outcome of the troublesome and vexing telephone situation is due to the efforts and initiative of J. W. Admire, a telephone man of 30 years' experience, who has had charge of the Council Grove plant since 1929. During his seven years' connection with the company, Mr. Admire has substantially improved the standard of service, converting the city system to full metallic and rebuilding the country lines. During the depression the company actually experienced a slight net gain in subscribers, in contrast to the losses which most companies sustained.

History of the Company

In May, 1906, farmers and citizens of the outlying towns of Morris county appointed delegates to confer with the residents and business men of Council Grove, the county seat, with a view to establishing a telephone system that would give them service to their county seat without a toll charge.

As a result of these negotiations the Council Grove Mutual Telephone Co. was organized with an authorized capital stock of $10,000. A town company was formed and different lines were formed into individual companies to serve the rural communities and take care of their individual problems. Arrangements were made for the town company to give them switching connections to all parts of the county at a rate agreed upon.

While the plant was new, service was good and things went smoothly. Feeling the effects of competition in that territory, the Missouri & Kansas Telephone Co. (as the Bell company was then known) withdrew from the Mutuals' use of its toll and long distance facilities. This created hard feelings between the companies, and a condition arose that down through the years continued to prove a source of friction and annoyance.

To put through a long distance call, a subscriber of the Mutual company was required to go to a station of the Bell company. The result was an increased determination on the part of the local company to see the fight to a finish.

J. W. ADMIRE, Manager of the Council Grove (Kans.) Mutual Telephone Co., Which Recently Took Over the Competitive Plant in Council Grove, Operated by the Southwestern Bell Telephone Co.

As time went on service of the Mutual company began to deteriorate. As is the case with many such companies, no one in particular was responsible for the physical condition of the plant; the result was little or no maintenance. Finally the conclusion was reached that something had to be done about the situation. Some thought the plant should be sold—lock, stock and barrel—to the Bell company, which by this time had changed its name to the Southwestern Bell Telephone Co., and negotiations were entered into by the Council Grove Mutual and Bell companies.

The efforts were without satisfactory results and after a time a reorganization of the Mutual company was effected. The rural and town systems were put under one head and the capital stock of the Council Grove Mutual Telephone Co. increased from $10,000 to $25,000. With the additional funds secured, the company rebuilt its plant. When the task was completed, the company had used all available funds and incurred a debt of $8,000. This was found to be quite a burden, as subscribers' dues constituted the only source of revenue.

Those in charge of the town company determined to clear up the indebtedness. This was finally done, but at the expense of service. Service became so poor that the residents of Council Grove, who could avail themselves of Bell service, began to shift over. The Mutual company fell into ill repute. It was generally said that the company did not know how to give good service.

The officers finally woke up to the seriousness of the situation, but it was too late to stop the shift of telephone users to the Bell. In a frantic effort to regain public confidence, the company, in 1928, went into debt to the extent of $4,000 in order to put in cable and improve service. The job was poorly done and, for a time, there were all kinds of trouble. More and more subscribers left the Mutual company to secure service from the Bell.

Then nature took a hand. On the night of May 11, 1929, the Neosho River, which runs through the center of town, went on a rampage and flooded the entire business district. All of the new cable recently installed was under water. Due to poor workmanship on the part of the cable splicer who had installed the cable, the company was all but out of business.

G. W. Coffin, president of the company, put in an SOS to the Kellogg Switchboard & Supply Co., at Kansas City, Mo., to send help. J. W. Admire, who was available at the time, was sent to the scene of distress, and after a couple of days service was restored on the Mutual system.

By this time realizing the need of an experienced telephone man to operate the plant, the officers of the company persuaded Mr. Admire to take charge. He assumed his new responsibilities on June 1, 1929. As soon as he got his feet squarely on the ground, things began to happen. Securing the consent of the officers of the company to incur an additional indebtedness of $9,000, Mr. Admire began at once to remodel the plant. He laid 25,000 feet of cable, made the

city system full metallic, rebuilt the country lines, and began to give the subscribers such service as they had never known before.

Negotiations were entered with the Bell company with a view to securing long distance connections, but they were unsuccessful. The Mutual company was now $14,000 in debt and without an outlet for long distance service. Then came the stock market crash.

Said Manager Admire in commenting upon events which ensued:

"It was now at the place where things would have to be steered pretty close to the shore. Things moved along, however, and once in a while there would be heard some comment that the Mutual was really giving good service and that it was possible to talk all over the county without any toll.

In the face of the depression, if we looked close enough, we could see that we were going along and gaining a few subscribers who had previously been Bell customers. Our indebtedness was being reduced at the rate of about $1,000 a year. During the years that followed, there was never a slackening up of the efforts to gain an outlet on the Bell long distance lines. There were physical connection bills introduced in the legislature at every session, until it became common talk around the state house. Finally the matter was taken up with Federal Communications Commission.

Then it was that the Bell company called for a conference and made a proposition to either buy, sell or consolidate under a new name. The basis for a deal was to be on the invoice price of the two properties. This invoice was then arranged with the Kansas Corporation Commission.

After many conferences and the elimination from the invoice price of the Bell property of such items as could not be used under the consolidation of the two plants, a figure was reached whereby the Mutual company was able to purchase the Bell property.

The Bell company received its check for the amount agreed upon, after the necessary hearings before the state corporation commission, and at night, March 20, the two plants were cut together and the two systems became one.

The company is now going right on and will convert to common battery by January 1, 1937. It expects then to have a new, modern telephone plant from which anyone in the county will have connections with his county seat without toll. Also, connection will be made anywhere over the long distance lines.

This means that another page has been written in the history of the telephone business in this county. 'This time, however, the Bell company has released a county-seat town"

The Operators' Corner

By MRS. MAYME WORKMAN

Traffic Supervisor, The Illinois Telephone Association, Springfield, Ill.

THE FILING time is an important ticket entry. It is used as a basis in determining report charges. Series No. 242

ONE OF the important items in recording a toll ticket is the "Filing Time" entry; that is, the time at which the customer places his call. This entry is used in determining whether a report charge is applicable on a person-to-person call, if the call is not completed. A chargeable report must be received within one hour from the filing time. If more than one hour has elapsed, no report charge is applicable.

In some cases, it is necessary to change the original filing time. For example, if a customer places a group of calls, known as "sequence" calls. when the operator makes the initial attempt on any call in the sequence except the first, she enters the time at which conversation ended or at which she gave a report of delay on the preceding call, encircled, in the "Filing Time" space. This entry is used in computing the time limit for giving a chargeable report on attempts on this call. However, there are two exceptions:

First, if the sequence has been brought forward from an earlier time on the same day or from a preceding day, the operator will enter the time at which the calling party agrees to have an attempt made, encircled, in the "Filing Time" space on the first ticket on which she makes an attempt.

Second, in some offices, operators may be locally instructed to start work on the next call of a sequence before conversation is finished on the preceding call, provided the operator is able to estimate the length of the calling party's conversations. When the operator makes an initial attempt under this condition, the time at which the operator starts to work on the new call is entered, encircled, in the "Filing Time" space.

Other cases where a new filing time is entered are on calls endorsed "AG (Time)." When the attempt is due, the time at which the calling party is ready to have his call tried is entered, encircled, in the "Filing Time" space.

On a ticket endorsed "AG (date)," the time at which the calling party is ready to have his call tried is encircled in the "Filing Time" space unless, prior to the time the request to try the call was received, a chargeable report had been given or the specified time limit (one hour) had expired. This same procedure is also followed on tickets endorsed "Hold for AG."

The filing time is also used in challenging for the use of a toll circuit. When two operators meet on a circuit, if the calling party is not holding the line and the operator's call, report, or order has not been acknowledged or if she has not passed an order, she challenges by saying, "My time is (filing time)."

All ticket entries should be accurate inasmuch as these entries determine the amount of the customer's charge and the company's revenue.

Questions from Illinois Operators

1. When is the filing time changed on a toll ticket?
2. On a paystation call, shall we pass the call to Long Distance?
3. Should an operator give directory service whenever possible? For example, a man comes to the office and asks if Mr. So-and-So in Chicago has a telephone or he wishes to refer to our Chicago directory for some information.
4. How should a ticket transfer be handled?
5. How long can an operator hold a built-up circuit on a "BY" report?

The answers to these traffic questions are given on page 25.

British Post Office's "House Exchange System"

To meet the needs of firms whose telephone requirements do not warrant the full-time employment of a switchboard operator, the British Post Office has developed a "House Exchange System." This equipment consists of a small sloping panel, containing a number of switch keys, which is associated with the ordinary telephone. The system is available in two sizes: for five internal telephones and one line to the public exchange; and for 10 internal telephones and one or two lines to the public exchange.

Here, There and Everywhere

Dallas, Texas, Had First Telephone in 1881

In recent Dallas, Texas, newspapers there appeared an advertisement relative to the first telephone in that city which was one of a series of advertisements gotten out by Sanger Bros. depicting dramatic moments in the history of Texas since 1857. The ad read:

"On May 15, 1881, a crowd had gathered at a jewelry store on Elm Street. A battery telephone, one of the first in Texas, had been installed. The sponsor of the telephone, D. M. Clower, was to talk over it from a telephone next door.

It was a tense moment and there were many prophets of failure in the crowd. . . . 'Can't tell me you can talk over that contraption.' . . . 'It's just a trick to make us feel foolish.' . . . 'I won't believe it even if it happens.' . . . 'I bet there's a hole in the wall that fellow next door is going to yell through.' . . . 'Wouldn't it be nice to be able to call up a store and tell them what you want?'

The signal tinkled and the man in the jewelry store listened for a minute. Amazement and wonder spread over his face. Another man stepped forward and put his ear to the receiver . . . then another. 'It sounds like the voice of a ghost,' someone commented.

The test triumphant, on June 1 following, the first Dallas telephone exchange was opened with a list of 40 subscribers. 'Central' was located at 224 Elm Street."

▼ ▼

Fine Illinois District Meeting at Galesburg

The fourth district meeting, sponsored by the Illinois Telephone Association, held in Galesburg, Wednesday, May 20, was a success both from the standpoint of attendance and interest. Approximately 100 chief operators, supervisors and operators and half that number of men officials and employes attended the meeting, which was held at the Galesburg Club.

A. J. Parsons, secretary-treasurer of the association, opened the meeting and introduced F. C. Woods, general manager of the Intra State Telephone Co. and a veteran telephone man. He extended a cordial welcome to all in attendance and an urgent invitation to visit the local exchange. E. D. Glandon, of Pittsfield, president of the Pike County Telephone Co. and a director of the association, responded to the address of welcome and paid a high tribute to Mr. Woods for his achievements in the telephone industry and named him the "Edison" of telephony.

R. G. Roadstrum, president of the association and manager of the local company, spoke briefly upon the activities of the association and also extended a hearty welcome to all present.

The meeting was then divided into two sections, Mr. Parsons presiding at the men's meeting and Mrs. Mayme Workman, traffic supervisor of the association, directing the operators' conference.

Mr. Roadstrum was toastmaster at the noon-day luncheon and introduced the following directors of the association who were present: J. I. Kennedy of Freeport, Dr. R. E. Gordon of El Paso, E. D. Glandon of Pittsfield, Dr. J. G. Schwarz of Jerseyville and H. A. Joslyn of Sycamore.

Invited guests present included representatives of the senior and junior chambers of commerce and directors of the Intra State Telephone Co. Mr. Roadstrum called on O. N. Custer, president of the latter company, for a few remarks.

An address of welcome on behalf of the city was extended by Wilfred Arnold, who was pinch-hitting for the mayor. Mr. Arnold gave credit to the telephone as one of the greatest instrumentalities in speeding up business. Probably half or more of all business transacted is done over the telephone, he said. Nowadays no one would think of going to see someone without first telephoning to make a date. Because of the time the telephone saves, one can accomplish more and in fewer hours than in the former so-called "horse and buggy days," he added.

Group singing was led by E. E. Hinchliff with Carrie Munson Brooks at the piano. Other entertainment at

(*Continued on page* 23)

One of the series of advertisements depicting dramatic moments in the history of Texas since 1857, when Sanger Bros. was founded.

In 1881 Dallas Had Its First Telephone and "Central"

On May 15th, 1881, a crowd had gathered at a jewelry store on Elm Street. A battery telephone, one of the first in Texas, had been installed. The sponsor of the telephone, D. M. Clower, was to talk over it from a telephone next door.

It was a tense moment, and there were many prophets of failure in the crowd . . . "Can't tell me you can talk over that contraption." . . . "It's just a trick to make us feel foolish." . . . "I won't believe it even if it happens." . . . "I bet there's a hole in the wall that fellow next door is going to yell through." . . . "Wouldn't it be nice to be able to call up a store and tell them what you want?"

The signal tinkled, and the man in the jewelry store listened for a minute. Amazement and wonder spread over his face. Another man stepped forward and put his ear to the receiver . . . then another. "It sounds like the voice of a ghost," someone commented.

The test triumphant, on June 1st following, the first Dallas telephone exchange was opened with a list of forty subscribers. "Central" was located at 224 Elm Street.

. . . . . .

Sanger Bros. was the first business house in Dallas to have a telephone.

SANGER BROS.

FORWARD WITH TEXAS SINCE 1857

Advertisement of Sanger Bros. Which Appeared Recently in Dallas, Texas, Newspapers Relative to the First Telephone in That City and the Amazement It Created Among the Townsfolk.

(*Continued from page* 18)

the luncheon included a vocal solo by Mrs. Workman and several amateur numbers by Knox College talent.

In the operators' meeting, C. R. Willis, traffic superintendent for the Illinois Commercial Telephone Co. at Springfield, spoke on "Present Day Training Methods," and Mrs. Myrtle Ray, traffic supervisor for the same company, gave an outline of the procedure followed by her company in introducing the new recruit to her surroundings and responsibilities in her duties as a telephone operator and explained the method followed in training local and toll operators. The remainder of the session was devoted to the discussion of everyday telephone traffic problems.

The men discussed problems pertaining to their part of the business and everyone entered into these discussions with interest and zest. Among the subjects covered were: "Courteous Employe Contacts," "Sales Activities," "Preventive Maintenance" and "Rural Electrification."

R. A. Schulze, engineer, Illinois Commercial Telephone Co., Springfield, by the use of diagrams explained the causes of inductive interference and the characteristics of various power circuits.

Four more meetings will be sponsored by the Illinois Telephone Association.

Photograph of Some of Those Attending the Convention of the Florida Telephone Association Held in Tallahassee on May 14 and 15. In the Front Row May Be Seen C. E. Archer, of Tampa, (Second From the Left) Secretary-Treasurer of the Association; W. G. Brorein (In the Center Wearing a Dark Suit), President of the Florida Association and President of the Peninsular Telephone Co. at Tampa; Chas. C. Deering, of Des Moines, Iowa; C. D. Brorein, of Tampa; and Otto Wettstein, Jr., of Leesburg, President of the Florida Telephone Corp. Behind C. D. Brorein is A. L. Geiger, of Washington, D. C.; and Back of W. G. Brorein, to the Left (Wearing a White Flower on Her Left Shoulder) is Miss Anne Barnes, of Des Moines, Iowa, Traveling Chief Operator for the United States Independent Telephone Association. The Complete Report of the Convention Appeared in Last Week's Issue of TELEPHONY.

"Employe Selling Plan" Successful in Canada

An elaborate telephone conference hook-up on the afternoon of May 1 was used by the Bell Telephone Co. of Canada to link speakers at the Montreal and Toronto headquarters with listeners in the general managers' offices and with groups of Bell workers in the auditoriums in those cities, and with still other employes listening at division and district headquarters throughout Ontario and Quebec provinces.

The occasion marked the 20th anniversary of the "Everybody Selling Plan" among Bell telephone workers of all ranks, inaugurated throughout Quebec and Ontario on May 1, 1916, whereby each is qualified to sell and to accept orders for telephone services, irrespective of his or her position apart from the regular sales staff of the organization.

For the western area, General Manager J. H. Brace at Toronto replied on behalf of his associates to addresses delivered by President C. F. Sise and Vice-Presidents J. E. Macpherson, Paul A. McFarlane and Fred Johnson.

Immediately following this widespread conference involving the two provinces and both areas, each area was simultaneously placed in the position of having an area telephone conference of its own, with General Manager Brace presiding for the western area and General Manager J. N. Groleau, at Montreal, for the eastern area. The division and district heads, grouped with their associates of the supervisory ranks then discussed further details of the history, deveolpment and progress of the "Everybody Selling Plan" activities throughout the past two decades.

President Sise, in referring to the company's reduced annual revenues and the losses in telephones in operation together with sharp declines in long distance usage through the lean years past, said there never was nor would be any need for telephone people to be apologetic about extensive and intensive efforts they make toward expanding the useful public service of the industry.

He congratulated all who had shared in the continuing prosperity of the business and indicated very definitely that the employe-selling policy had accomplished much in the interests of telephone users and investors alike.

Vice-President Macpherson told of an important two-fold effect of the selling idea on public opinion and on employe morale through the years and stressed the value of public service organizations making continuous and systematic efforts to attract new business.

Similarly, he said, the plan had stimulated the interest and enthusiasm of telephone workers in all branches of the service through their wider knowledge of it and the manifold ways in which it could be employed to serve both new and old customers more effectively.

Vice-President Paul A. McFarlane presented interesting figures revealing the appreciable results of employe sales activities in terms of additional revenues apart from over-the-counter and other offered business, stating that for 1935 alone results from the plan represented 73,136 sales and prospects produced and 30,587 telephones put into operation. During 1935, Bell employes made 41,806 direct sales of equipment or service.

Vice-President Fred Johnson, speaking from the accounting and financial viewpoint, told of the numerous opportunities for selling telephone service that were presented in social contacts to Bell workers who, in their daily routine duties, did not come into contact with the public at all. He pointed to the improved prospect for the telephone business as indicated by this year's results both in exchange and long distance service.

Commission and Court Activities

Hearing Changed in Poteau, Okla., Case

The Telephone Division of the Federal Communications Commission has changed the date of hearing in the case of the Oklahoma-Arkansas Telephone Co., of Poteau, Okla., against the Southwestern Bell Telephone Co., of St. Louis, Mo., to October 5. It will be held at Hotel Goldman, Fort Smith, Ark., before an examiner of the FCC. The examiner may also take such testimony as may be necessary at Poteau.

The hearing was originally scheduled to be held on July 6.

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FCC Accounting Appealed to Federal Supreme Court

The American Telephone & Telegraph Co., The Ohio Associated Telephone Co., and The Eastern Telephone & Telegraph Co. on May 22, took to the United States Supreme Court the revised system of uniform accounting prescribed by the Federal Communications Commission, which was to have become effective January 1, 1936.

The appeal to the high court was made on a decision of a federal statutory court in New York, denying a permanent injunction against enforcement of the commission's accounting order (TELEPHONY of February 29, 1936). The United States Supreme Court was asked to take jurisdiction in the matter.

The principal objections of the telephone companies are against being required to record purchased plants at the original cost of construction and against the method of depreciation.

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Rates on International Calls to Be Cut July 1

The American Telephone & Telegraph Co. on May 26 filed with the Federal Communications Commission a schedule of reduced rates, effective July 1, from the United States to foreign countries.

Under the new schedule three-minute calls from eastern seaboard cities to Paris and London will be reduced from $30 to $21 in the daytime, and the Sunday and night charge will be $15. The reductions apply to 45 of the 67 countries which may be reached from the Bell System telephones.

The new schedule reduces charges on three-minute calls to Europe $9 on week days, $6 at night and $15 on Sundays. Charges to most South American and Central American countries will be scaled $9 on week days and $15 on Sundays. Charges to Puerto Rico and Cuba also will be cut. Rates on conversations of more than three minutes are correspondingly reduced.

The night rates to London, Paris and Berlin will be the same as the Sunday rates under the new schedule. The Cuba three-minute station-to-station calls will be cut by $1.50 and person-to-person calls correspondingly. Night and Sunday rates are also lower.

When the Bell Telephone System inaugurated the service to Europe in 1927 a three-minute conversation between New York and London cost $75. In 1928 the rate was cut to $45 and in 1930 was further reduced to $30. The new cut is the fourth since the beginning of the service.

Simultaneously with the announcement by the American Telephone & Telegraph Co. of the reduction, Samuel Becker, special counsel for the FCC investigation of the Bell company's affairs, said that it was the government's intention to find out why domestic telephone rates had not been cut during the depression years.

Mr. Becker used the announcement of the A. T. & T. Co. as a psychological time to call attention to the fact that domestic rates have remained unchanged in recent years. The new rates were announced by the company in New York and also by Paul A. Walker, chairman of the telephone division of the FCC, in Washington.

▼ ▼

Fort Smith, Ark., Not Exempt from Rate Inquiry

The Arkansas Department of Public Utilities on May 11, rejected a petition of the city of Fort Smith, seeking exemption from a state-wide telephone rate investigation order so that it could negotiate directly with the Southwestern Bell Telephone Co. on new schedules. The commission said more than a year had elapsed since the passage of the act setting up the commission and that Fort Smith had failed to take advantage of the time to pass a rate reduction ordinance.

"The department is of the opinion that should it dismiss this cause as to Fort Smith, it should dismiss the statewide investigation with respect to all rates of defendant in all cities and towns that did not act prior to March 24."

Fort Smith asked the exemption so that a rate reduction ordinance could be passed. This would require the company, on appeal to the commission, to post bond for the protection of subscribers in the event the ordinance was upheld.

"The department is of the opinion that it has the power to enter a rate order and make it retroactive to a date subsequent to the time the department acquired jurisdiction of the case," the order said.

"Subscribers of telephone service will, under the investigation of the department, receive the benefits of any justifiable reduction in rates as early as they would if the cause were dismissed now."

In another order, the commission widened the scope of an investigation of telephone rates charged by E. Ritter Telephone Co. to include Marked Tree, Kyzer and Tyronza, in addition to Lepanto. Lepanto passed a rate reduction ordinance prior to the issuance of the state-wide investigation order and the case is before the commission on appeal.

"It would be impracticable, as well as almost impossible, to determine what would be fair and just rates for Lepano without, at the same time, making such a determination of such rates at the other exchanges operated by the company and also for its toll operations," order said.

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Alabama Rate Appeal Seeks Greater Reduction

Notice of appeal from the Alabama Public Service Commission's order, reducing rates of the Southern Bell Telephone & Telegraph Co. by $250,000, was filed in Montgomery Circuit Court on May 11, by Attorney General A. A. Carmichael for the state and Horace Wilkinson for the city of Birmingham. Attorney Wilkinson seeks a 40 per cent cut in rates instead of the reduction ordered by the commission.

Hugh White, chairman of the Alabama commission, stated that the reduced rates—which became effective May 1—will stay in effect unless the court rules otherwise.

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Enjoins Directory Listing Misleading to the Public

The California District Court of Appeals, second appellate division, ruled in the case of the Hoover Co. vs. Groger and Southern California Telephone Co. that the plaintiff is entitled to an injunction to restrain the publication, in the classified telephone directory of the defendant, of the names of some 17 electric service companies, also engaged in

vacuum cleaner repairing, under the heading, "Hoover Vacuum Cleaner Repairing." It reversed the ruling of the lower court which held for the defendants.

The court held that "a name long used by a business firm becomes an asset of the business and a party may not use that name in his advertisement in such a manner as to confuse the public to the disadvantage of the firm first using the name."

According to the court's findings, the plaintiff, under the names, "The Hoover Co." and "Hoover Suction Sweeper Co." is and for many years has been engaged in the business of manufacturing vacuum cleaners and maintaining repair stations in Los Angeles and elsewhere throughout the nation and has long used the words, "Hoover Vacuum Cleaner Repairing" in connection with their business. The name "Hoover" has become well known to the public.

The Southern California Telephone Co. in its classified business directory, has been listing other electric service companies under the words, "Hoover Vacuum Cleaner Repairing" and, as alleged in the complaint, proposed to issue a new directory with the vacuum cleaner repairing electric companies listed in the same manner as previously.

The court, in sustaining the complaint of the Hoover Co. and ordering the injunction prayed for, says "it is the policy of the law to protect the business of the first person to enter the field doing business under a given name to the extent necessary to prevent fraud upon his business and upon the public." "It is not necessary," says the court, "for the plaintiff to prove fraudulent intent. The defendant may be enjoined if the natural consequence of their conduct is such as to cause deception."

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Preliminary Injunction in Directory Case

Judge Knight of the United States district court at Buffalo, N. Y., has issued a preliminary injunction restraining James E. Gowan, doing business as the Jamestown Advertising Sales, from distributing his classified directory of the Jamestown, N. Y., area or any revision thereof and from selling or giving away advertising in his book. The defendant was further ordered to deliver all copies of the book in his possession for impounding.

The injunction is continued in force until entry of final judgment, but the case has not as yet been placed on the court calendar.

Complaint in this proceeding was filed by the Jamestown Telephone Corp., through its commercial manager, Wm. J. Hunt. (See TELEPHONY of April 4, 1936, page 36). It charged infringement upon the copyrighted Jamestown telephone directory and asked for an accounting of the profits made thereby as well as an accounting of the losses sustained by the telephone company, attorneys' fees and court costs.

Answers to Traffic Questions on Page 17

1. Please refer to the introduction to these questions.
2. Yes, unless there are special trunks appearing on the toll board to be used for calls originating at pay stations.
3. Yes, comply with his request. However, do not permit him to take the directory out of the building.
4. Refer the call to your supervisor. If she authorizes the transfer, reach the new OTC TX, announce that you wish to transfer a ticket, and pass the complete details of the call, including any details which are necessary to complete the call. As soon as acknowledgment is received, clear the toll circuit, enter "transferred to (new OTC) (time)" under the last entry on the ticket and "cov" on the face of the ticket at the top and file the ticket.
5. Five minutes.

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Orders Five-Cent Cut for Calls from Hotels

An order issued by the Missouri Public Service Commission on April 23 requires the Southwestern Bell Telephone Co. to file, effective June 1, a revised schedule of rates to be charged for telephone calls from guest rooms in St. Louis hotels. The present rate for such local exchange calls is 10 cents. The order of the commission reduces this rate to 5 cents per call.

It is provided in the order that the company may file a schedule allowing any hotel in St. Louis to charge a rate not greater than 10 cents per call outside, made from the lobby or other public gathering places within the hotel.

This order followed investigation of the complaint filed several months ago by the Jefferson Hotel and 32 other hotels in St. Louis.

With the exception of the reduction ordered in the rate for calls from guest rooms and apartments in hotels, all other complaints and charges carried in the petition of the complaining hotels were dismissed.

On May 4, the St. Louis Hotel Association asked the Missouri commission to rehear its application for revision of charges to hotels for room telephone calls in St. Louis.

The hotels contended the five-cent order was invalid as it was directed at the telephone company, which they asserted was without power to enforce against hotels. They also held the commission's report showing the telephone company was charging four cents a call now was incorrect and that it actually charged hotels 10 cents by adding rentals and other charges.

The hotels maintained the telephone company discriminated against them by charging them a rate twice the amount it had fixed for Kansas City hotels on room calls.

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Enjoins Distribution of Directory Binders

The Court of Common Pleas of Allegheny County handed down its decision recently in the case of the Bell Telephone Co. of Pennsylvania vs. Rogers in which it granted a perpetual injunction restraining the defendant from soliciting advertisements for and from distributing binders, holders or auxiliary covers to be placed upon or attached to telephone directories of the subscribers of the plaintiff.

It held that the defendant was unlawfully interfering with and damaging the business and service of the plaintiff and was unlawfully depriving it of the advertising benefits from its directories by depreciatinng and destroying the value of the advertising space on and in such directories by obscuring them, and that the sale of advertising space and the distribution of binders, holders or auxiliary covers of the defendant and their use by the plaintiff's subscribers constitutes an unlawful and unfair competition with the plaintiff and an illegal interference by the defendant with the rights of the plaintiff and the business being carried on in it.

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Commission Rulings and Schedule of Hearings

Federal Communications Commission Washington, D. C.

May 5: Application filed with the Telephone Division by the Mountain States Telephone & Telegraph Co. requesting authority for a telephone wire certificate to acquire, construct and operate a line from Mammoth Hot Springs, Wyo., to Cooke, Mont.

May 5: Application filed with the Telephone Division by the Northwestern Bell Telephone Co. requesting telephone wire certificate for authority to supplement existing facilities between Pine Ridge, S. D., and Rushville, Neb.

(*Please turn to page* 33)

California Winter Resort Has Modern Telephone Exchange

By E. R. FISHER

Local Manager, California Water & Telephone Co., Redlands, Calif.

IN A UNIQUE setting, with a mountain peak for background, stands the new exchange building erected last year by the California Water & Telephone Co. to serve the growing community of Palm Springs, until 1925 entirely without telephone communication

This New and Attractive Spanish Type Building Was Erected at Palm Springs, Calif., Last Year by the California Water & Telephone Co. It Houses Two Two-Position Toll Sections With Three Positions Equipped and Strowger Automatic Equipment for the Handling of Local Exchange Calls.

AT THE EDGE of the Colorado desert, under the shadow of old Mt. San Jacinto, lies Palm Springs, Calif. Until 1925 it lay quiet and sleepy, a little village, the home of the Agua Caliente Indians and a few white people who loved the desert.

Their only wire communication with the outside world was a telephone line to the railroad station five miles distant. Telegrams were received and dispatched over this circuit. In 1925 a telephone line was built to connect with the Pacific Telephone & Telegraph Co.'s toll lines and later another circuit was added.

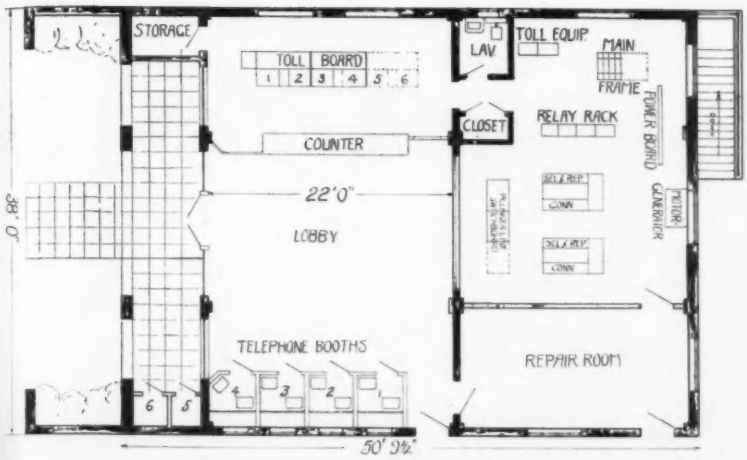
In the summer of 1927 the Southwestern Home Telephone Co. of Redlands, Calif., built a local telephone system, although this intrusion was resented by quite a number of the population. A vacant store was rented and an Automatic Electric Co. C.A.X. was installed. It soon became evident that estimates based on the original canvass would have to be revised and, before the first season was closed, additions to plant and equipment were necessary.

The Toll Board in the Palm Springs Exchange Is Located in the Lobby, the Operator Acting as Cashier in the Off Season. During the Winter Season There Is a Large Amount of Office Pay Station Business Handled Here.

Being on the desert, extreme summer temperatures were recorded. The winter resort season opens in November, reaches its peak in March, and closes in May, depending more or less on the weather. The lure of the desert has attracted so many people to Palm Springs that its growth has been rapid, especially in the last two years.

In 1934 it became apparent that larger telephone exchange quarters were necessary, and in 1935 a site was purchased and improved with a two-story building. Planned primarily by O. A. Prest, division manager of the California Water & Telephone Co., it is a dignified Spanish type structure of reinforced concrete throughout, fire and earthquake proof. The lower floor consists of an entrance arcade, a large lobby, equipment and terminal room, and repair room.

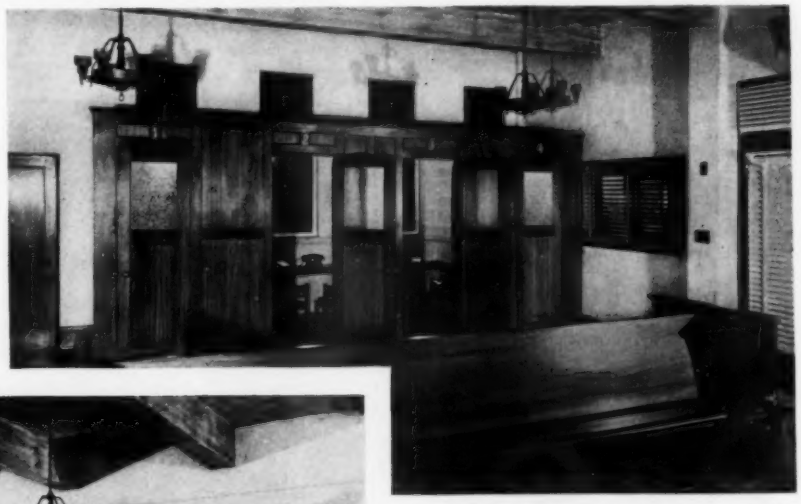
The lobby is attractive with a concrete beam ceiling, walls treated with



Floor Plan of the New Palm Springs, Calif., Exchange of the California Water & Telephone Co., Showing Equipment and Office Floor Layout.

acoustic plaster, and floored with marbled asbestos tile. The interior woodwork is of mahogany. Because there is a large amount of office pay-station business, and also because during the off season months the operator acts as cashier, it was deemed advisable to locate the toll board in the lobby.

This is placed at one end of the room separated from the public space by a counter. The opposite side of the lobby is devoted to booths, of which there are four. Each booth, large enough to seat two persons comfortably, is equipped with chairs. The booths are finished with acoustic board in plank and panel



Two Additional Views of Lobby in the Palm Springs Exchange, the Upper One Showing the Public Telephone Booths and the Lower One Showing the Machine Switching Equipment, a Plate Glass Window Forming the Only Separation Between the Equipment Room and the Lobby.

form and, besides being unconventional are efficient and roomy. Two conventional size booths are located in the outside portico for night service.

A feature of the lobby is the large plate glass window which separates the equipment room and the public space. This is found to be of extreme interest to visitors and serves to show what is behind the little dial that makes connections between stations possible.

The upper floor is devoted to living quarters for the employes, which becomes a problem in a fashionable resort. An apartment with kitchen and dinette is furnished the chief operator, the remaining rooms being bedrooms. The roof is insulated to improve living conditions in warm weather when the temperature reaches high levels.

A small basement serves as battery room and the cable entrance and runway is below the first floor. The switchboard is of Automatic Electric Co. manufacture, consisting of two two-position sections with three positions equipped. The local switching equipment is automatic, with plunger-type line switches.

Because of the large P.B.X. development there is a group of trunk hunting connectors. Four-frequency harmonic ringing is employed. The power plant comprises a duplicate set of storage cells, a Rochester diverter-type generator with a Tungar rectifier for periods of light loads.

Toll connections are obtained over the lines of the Southern California Telephone Co., 15 circuits being necessary to handle the traffic.

The Southwestern Home Telephone Co., no longer an operating company, has been succeeded by the Califonia Water & Telephone Co. Mr. Prest, who was largely responsible for the planning of the new Palm Springs building, as manager of the telephone division, has offices at Monrovia, Calif. The Palm Springs office is directly under the supervision of the company's district office at Redlands.

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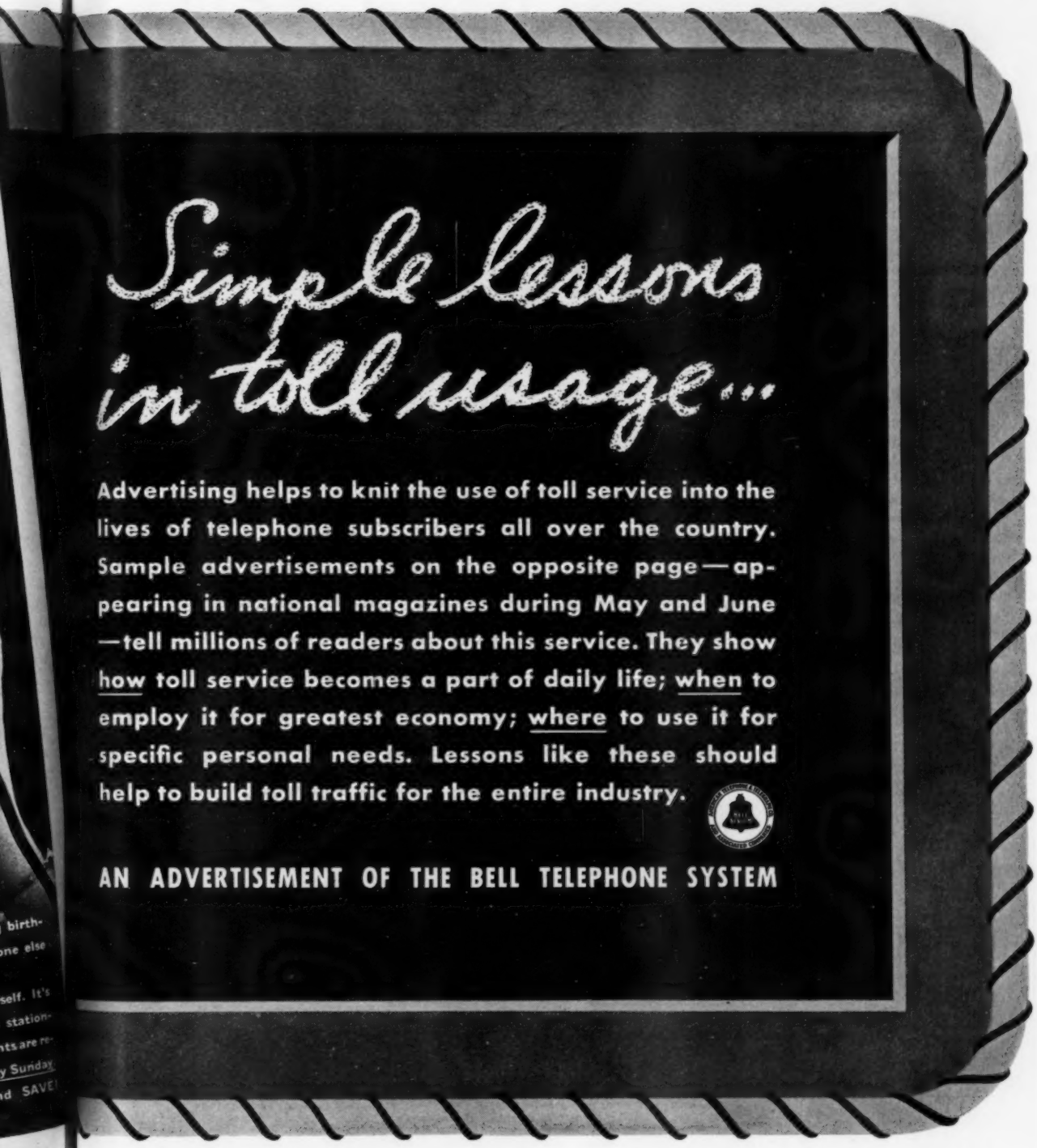
Recent Prices in the Metal Markets

New York, N. Y., May 25: Copper—Quiet; electrolytic spot and future, 9.50c per lb; export, 9.00@9.05c. Tin—Steadier; spot and nearby 45.87½c per lb; future, 44.87½c. Iron—Quiet. No. 2. f.o.b. eastern Pennsylvania, $20.50 per ton; Buffalo, $19.50; Alabama, $15.50. Lead—Steady; spot New York, 4.60@4.65c per lb; East St. Louis, 4.45c. Zinc—Dull; East St. Louis spot and future, 4.90c per lb. Aluminum—19.00@22.00c per lb. Antimony—Spot, 13.50c per lb. Quicksilver—$75.50@76.00 per flask, Wolframite—16.00c.

"Thank you—now I can go to sleep"
THE telephone brings happiness to many people in many ways. Here's a note postmarked from a town in North Carolina:
"Sitting alone in my hotel room tonight, thinking of my little red-headed boy sick at home—I saw a telephone advertisement and called home. Thank you for the advertisement. Now I can go to sleep."
Some one, somewhere, would be happy to hear your voice tonight. Both station-to-station(1) and person-to-person(2) rates to most points are reduced after 7 every evening and all day Sunday.
(1) Station-to-station: When you call a telephone number or ask to talk with "any one" at a specified address.
(2) Person-to-person: When you call a specific person or a specific private branch exchange extension.
The Gift that only you can give
When far-away friends or relatives are celebrating birthdays or other anniversaries, there's one gift no one else can give—your voice.
Telephoning is next best to being there yourself. It's personal. It's fun. It's inexpensive too. Rates on station-to-station and person-to-person calls to most points are reduced every evening after 7 and all day Sunday.
Telephone tonight or Sunday and SAVE!


Simple lessons in toll usage...
Advertising helps to knit the use of toll service into the lives of telephone subscribers all over the country. Sample advertisements on the opposite page—appearing in national magazines during May and June—tell millions of readers about this service. They show how toll service becomes a part of daily life; when to employ it for greatest economy; where to use it for specific personal needs. Lessons like these should help to build toll traffic for the entire industry.
AN ADVERTISEMENT OF THE BELL TELEPHONE SYSTEM

Airco Oil-Pumped Nitrogen Cylinders in Reserve for Use in Telephone Cables at Hartford, Conn., During the Recent Flood.

Airco Helps Maintain Emergency Service

By P. B. COWELL

Air Reduction Sales Co., New York City.

A SMALL and usually quiet river has become a raging sea! The peaceful Connecticut River has risen to record heights. In some places it is miles from shore to shore. Sections of Hartford never before flooded in the history of the city are covered to a depth of 12 or more feet with swift-moving water. The city, unprepared for such an emergency, is panic-stricken. When will the waters stop rising?

A watcher in the upper story of the Travelers Insurance Building sees large gasoline storage tanks across the river tip, swing in the current which has flooded the oil yards of several large oil-distributing depots. Will the piping attached to the tanks hold them, or will they get away? One tears away and starts down the river, then another and another until five of these monsters are on their way toward the only remaining connection between the two shores of the river which is not covered with water—the railroad bridge at Middletown, a few miles down the river.

Middletown must be warned! The telephone does the trick. Boats are sent to head off the tanks, and steer them into the fields on the side of the river, where they run aground, and the bridge is safe. Thank Heaven the telephone was still working! Let's see why the telephone was still working.

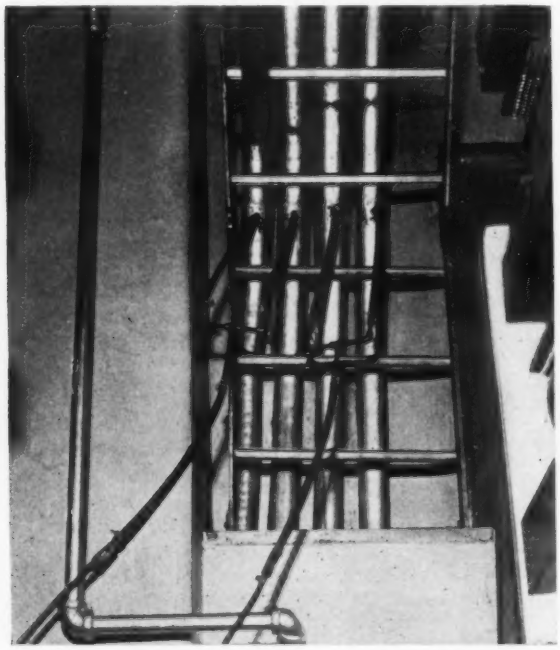
At the Southern New England Bell Telephone Building there is much concern but no panic. The water is up to the first floor, and going higher. Power has failed but this has been offset by four 300-ampere gasoline engine driven electric welders hooked in with two house-lighting generators which are giving enough current to keep things moving in the telephone building.

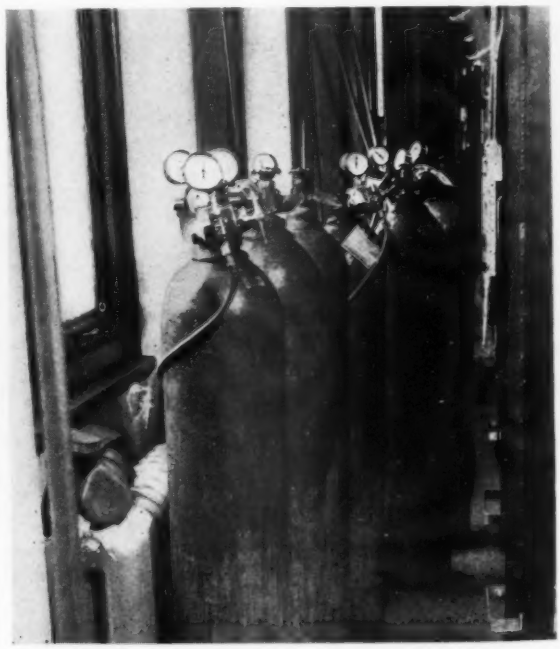
This temporary power plant, set up in a near-by vacant lot which is just above water level, is maintaining a 25 per cent emergency service. The power line is passed into the telephone building through an adjacent building, and over a catwalk between the two buildings.

But what about those cables that are under the streets filled with the muddy river water? They were never designed to withstand such a flood as this. A call to Jersey City at 3 a. m. starts a load of Airco oil-pumped nitrogen on its way to Hartford. A call to Bridgeport locates a local Airco representative, and the oil-pumped nitrogen in stock at this local warehouse is on its way to the distressed customer in Hartford at 4 a. m.

This shipment arrives just in time to start a flow of nitrogen into the trunk line cables to combat the pressure of the rising waters, and keep the service going so that warnings, calls for aid, and vital messages from Hartford can go through without delay. Airco service clicked again and saved the day for Hartford's telephone service!

This nitrogen was fed into the cables from the inside of the telephone building at 35 pounds pressure. One of the accompanying illustrations shows the Airco nitrogen cylinders stacked up outside the temporary building housing the makeshift power plant. Another shows the cat-walk with the emergency power cables attached leading into the telephone building. Other photographs show the set-ups in the building, and the method of "gassing" the incoming cables. Airco two-stage regulators are shown feeding gas to the telephone cables. The verdict of the men handling these regulators was that they were "blankety-





Nitrogen Feed Lines to Telephone Cables—Airco Oil-Pumped Nitrogen Cylinders with Airco-DB Two-Stage Regulators Feeding Gas to Telephone Cables at 35 Pounds Pressure.

COOK CABLE TERMINALS

XB

The universal acceptance of Cook XB terminal was not just an accident, it was the result of the years of successful experience with all steel constructed terminals of the protected type.

The unique method of fastening the cable to the corebox, and the clamp to prevent vibration at the point where cable enters the corebox has eliminated any possibility of leaks at that point.

The terminal is reversible, stub out of top or bottom by simply reversing the hood.

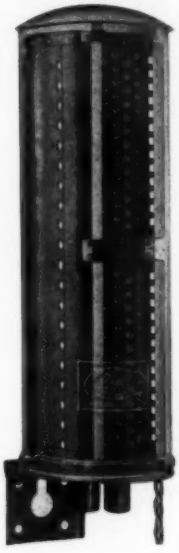
A terminal of exceptional value at a very moderate cost.

M16

A sealed cable chamber terminal arranged for multiple cable nozzles. To be used as a test point for either aerial or underground cable. Full cross connection and drop distribution provided.

An ideal terminal for rural cable between unattended exchanges or as a junction point of aerial and underground cable. Base, corebox and self-soldering nozzles are of steel, formed and hot galvanized. Face plate is of bakelite. Studs, nuts and washers are of Everdur metal. Hood is of steel, hot galvanized.

Made in 11, 16, 26 and 52 pair sizes as illustrated, and up to 404 pairs mounted in pole houses.



COOK ELECTRIC CO., CHICAGO, ILL.

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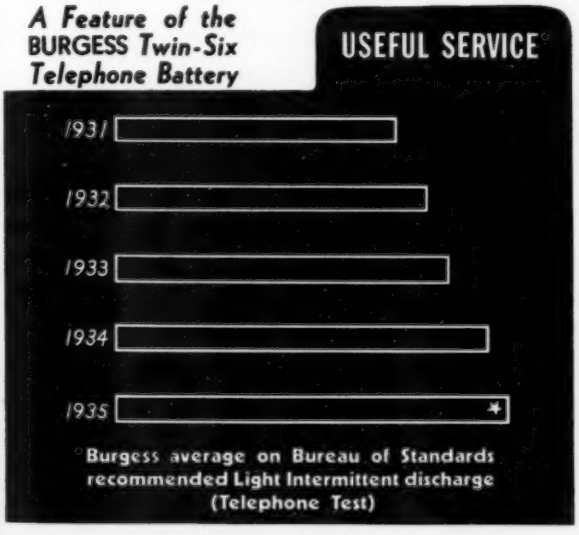

★ Burgess Twin-Six Telephone Battery sets a new high service record for 1935 on the Bureau of Standards test. Year after year Burgess Batteries give more and more hours of actual service. Try them under your toughest service conditions — a conclusive test that will prove greater Burgess values.

Price is 39c each in lots of 30, freight prepaid. Order today from Inland Equipment Company (Distributors), Max F. Hosea, President, Indianapolis, Indiana.

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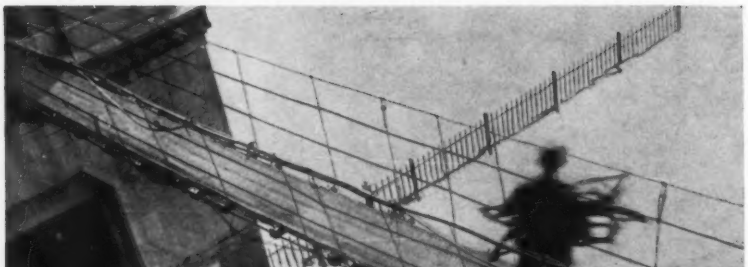

Cat-Walk Over Flood Waters Between Two Buildings, Carrying Emergency Power-Line From Arc Welding and House-Lighting Generators.

blank" good regulators, and that if the rest were like those they could get in a few smokes as they didn't need watching.

This performance was all in a day's work for two splendid companies, both of which have kept a bit ahead of the times.

▼ ▼

Telephone's Part in Fire at Canadian Boarding School

Antoine Dubuc, manager of La Compagnie Du Telephone Saguenay-Quebec, Chicoutimi, Quebec, recently directed the attention of F. B. MacKinnon, president of the United States Independent Telephone Association, to the importance that telephone service played on the occasion of a big fire in the Ste. Cecile wing of Villa Maria convent, in Montreal, last month.

This boarding school is equipped with an internal automatic fire alarm but it is not connected with the city alarm system. The closest city signal is located a distance of 700 yards from the main buildings. Lieut. Lussier, of fire station No. 27, was on duty at station No. 34 on the night of the fire and answered the telephone call made from the convent by Mother St. Pierre Chanel.

▼ ▼

Toll Lines Relocated in Flood Control Project

Work has been started by The Ohio Bell Telephone Co. on an $11,000 improvement job along the long distance line between Mingo Junction and Cadiz, Ohio. Among the circuits on this line are those running from Steubenville to Cleveland and Steubenville to Columbus. The line goes by way of Uhrichville and Dennison. The work between Mingo Junction and Cadiz consists of rehabilitation of the pole line. More than 440 poles will be replaced.

This is the second job to be done along this line, due to the government's Muskingum Valley flood-control project. The other, recently completed at a cost of nearly $25,000, was necessitated by construction of the Tappan Dam, near Tappan, Ohio, at the Uhrichville-Dennison end of the pole line.

This flood-control project compelled the Ohio Bell company to completely relocate several miles of the pole line to get it out of the area which will be subject to immersion.

Workmen placed 356 poles and 160 miles of wire during the first job. When this new plant was completed and in service, they removed 382 poles and 146 miles of wire. Thus, the total expenditure on improving and relocating the long distance line will, when completed, approximate $36,000.

▼ ▼

More Good Telephone Publicity

The Morrison (Ill.) Sentinel in a recent issue printed a two-column article describing the plant of the Morrison Telephone Co. and praising the good service it affords its 1,400 subscribers.

The concluding paragraph says:

"The Morrison Telephone Co. is the result of a splendid combination of a business opportunity with good professional principles and excellent management. It is a wholesome thing, in these days of ever-increasing government regulation, if not actual government ownership and big business, to ponder the case of a small business that is not only holding its own but actually excelling the service given by its bigger competitors."

Such intelligent comments are gratifying in these days of economic uncertainty.

Spring House-Cleaning

By MISS ANNE BARNES

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

SPRING has been on the way to us for such a long time that we were beginning to wonder whether it would come at all. But it has arrived at last. Now many of us have something else to worry about—the big job of house-cleaning. Quite often we have heard housewives remark, during the dark, smoky and dirty days preceding spring: "Oh, my house is a sight! I can scarcely wait for spring house-cleaning time to come."

The trouble is, we put so many tasks aside to do when house-cleaning time arrives that the job looms before us like a mountain. But I do not think the big job gets us down as do the numerous little things which we put aside to do later. They might just as well have been done right along with regular housework, but we gave them the once-over and as we chucked things—too good to throw away, or worthless—into dark corners, out of sight, we said to ourselves: "That closet is a fright! I should clear it out. But I'll wait now until I house-clean."

It seems to me that a chief operator in any medium-sized exchange, who has to depend on her own efforts and those of her operators to keep her traffic house in order, could do no better thing this spring than to get into the corners of her service — little out-of-the-way places—and rid them of errors too small to give them much concern as units, but which, nevertheless, contribute toward lowering the quality of the service.

She will, undoubtedly, find some practices shelved and dusty from non-use; "We used to do that but we just got out of the habit." Others in use, because "We have always done that way," should be shelved.

COMMISSION AND COURT ACTIVITIES

(*Concluded from page 25*)

May 20: Telephone Division granted authority to the Northwestern Bell Telephone Co. to supplement existing pole line facilities between Pine Ridge, S. D., and Rushville, Neb.; to place crossarms and string pair of copper wires on existing poles, at an approximate cost of $7,870.

May 20: Action taken by the Telephone Division in the case of the Oklahome-Arkansas Telephone Co., of Poteau, Okla., against the Southwestern Bell Telephone Co., of St. Louis, Mo., changing the hearing to October 5 and fixing the place at Hotel Goldman, Fort Smith, Ark.; to be heard by examiner with directions to take such testimony as may be necessary at Poteau.

May 26: American Telephone & Telegraph Co., having completed arrangements with telephone administrations and companies in foreign countries, filed a rate schedule substantially reducing rates for international calls.

Typical of the rate changes stipulated in the new schedule are: London $21 for three minutes, compared with the old rate of $30. The same basic rate and the same reduction applied also to Paris, Buenos Aires, Lima, and Rio de Janeiro. Sundays the rate to all these points drops from $30 to $15.

Arkansas Department of Public Utilities

May 11: Order issued rejecting petition of the city of Fort Smith seeking exemption from a state-wide telephone rate investigation order so that it could negotiate directly with the Southwestern Bell Telephone Co. on new schedules.

May 11: Order issued widening the scope of an investigation of telephone rates charged by the E. Ritter Telephone Co. to include Marked Tree, Keiser and Tyronza, in addition to the Lepanto exchange. Some time ago the city council at Lepanto passed a rate reduction ordinance prior to the issuance of the statewide investigation order and the case is before the commission on appeal.

May 21: Hearing on application of the Southeast Arkansas Telephone & Power Co., of West Memphis, for authority to sell its properties at Perry and Perryville to R. H. Moore, of Camden.

California Railroad Commission

May 16: Lower rate schedules filed by the Associated Telephone Co., Long Beach, approximating $30,800 a year.

Illinois Commerce Commission

May 26: Hearing on complaint of John C. Cremer against the Illinois Bell Telephone Co., concerning cash deposits, illegal, discriminating and otherwise and to re-audit and review company charges, practices, etc., in Chicago.

May 27: Hearing in Chicago of oral argument on complaint of the Clearing Industrial Association, et al. ,against the Illinois Bell Telephone Co., charging unjust and unreasonable charges for telephone service by the Illinois Bell Telephone Co. to complainants in the Chicago exchange area.

May 28: Hearing in Chicago on citation of the Illinois Commerce Commission on its own motion against the Illinois Bell Telephone Co. to show cause why there should not be a reduction in rates for intrastate telephone service rendered by the company.

May 28: Hearing in Chicago on proposed change in certain rates of the Illinois Bell Telephone Co. as set forth in docket case No. 23774.

Missouri Public Service Commission

May 4: St. Louis Hotel Association asked the commission to rehear its application for revision of charges to hotels for room telephone calls in St. Louis. The commission, on April 3, ordered the Southwestern Bell Telephone Co. to cut hotel room rates to five cents a call to guests, effective June 1. The present rate is 10 cents, of which the hotels had sought a larger share.

The hotels contended the five-cent order was invalid as it was directed at the telephone company which, they asserted, was without power to enforce against hotels.

May 21: Approval granted application of the Citizens Public Service Co. of Missouri to file a rate schedule for common battery service at Eldorado Springs.

North Dakota Railroad Commission

May 11: Order issued permitting the First Farmers Telephone Association, of Lansford, to dismantle certain sections of its line. As a result, the company is permitted to take down approximately 10 miles of lines affecting 14 parties.

Ohio Public Utilities Commission

May 21: Upon application, the commission authorized the Higginsport Independent Telephone Co. to reduce 25 cents per month its present tariffs: Single-line telephones, $2.00; four-party, $1.75; all other urban telephones, $1.50; rural 12-party lines, $1.50.

May 21: Upon application, the Community Telephone Co. of Leipsic, was authorized to file a supplement, establishing the following additional services: Extensions, business or residence, 25 cents; extension bells, business or residence, 25 cents; joint user, business $1.00, residence 50 cents; desk set extra, 25 cents (to be discontinued after three years); handset, business or residence, 50 cents extra, to be reduced to 25 cents after three years.

May 22: Permission granted to the Ohio Bell Telephone Co. and the Cincinnati & Suburban Bell Telephone Co. to reduce the monthly charge on handset telephones to 15 cents from 25 cents. Authority was also granted to discontinue the charge after subscribers have paid a total of $5.40 instead of the present $9.

Pennsylvania Public Service Commission

May 19: Hearing in Harrisburg on application of the Bell Telephone Co. of Pennsylvania for permission to use certain conduits, cables and other facilities of the American Telephone & Telegraph Co. in Lackawanna, Monroe and Wayne counties.

South Carolina Public Service Commission

May 13: Order issued directing all water, gas, telephone and electric utilities, operating in the state, to revise their methods of paying interest on deposits to customers.

Wisconsin Public Service Commission

May 14: Permission granted the Commonwealth Telephone Co. to market its own securities. The company operates 105 telephone exchanges in Wisconsin.

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CABLE TERMINAL

Reliable RU unprotected terminals are easier to install, easier to work on and built to outlast the cable.

Write for a Sample

Reliable Electric Company

Chicago, Ill.

Care of Lineman's Climbers

Among the most important items in the lineman's tool kit are his climbers Many serious accidents have resulted from improper care of climbers. Fig. 1 illustrates the general appearance of a modern pair of climbers. A climber consists of a narrow, flat strip of high grade spring steel

(A) Standard Climber.

(B) Tree Climber.

FIG. 1. TWO TYPES OF CLIMBERS.

which has been forged into the shape of an L. On the back side of the steel leg iron or shank, a gaff or spur is securely riveted and so arranged as to project downward. Two leather straps, one fashioned into a loop at the bottom of the climber and another one into a loop at the top, hold the climber to the lineman's leg.

Climbers are like shoes and must fit the leg of the wearer. They are made in various sizes and should be ordered to fit. A climber too short or too long will cause great discomfort to the wearer. Climbers are made in sizes ranging from 15 to 18 inches. The size is measured from the instep to the end of the shank. Most linemen bend the shank (leg iron) so as to fit the curve of their leg.

Some men complain constantly about climbers being uncomfortable on their feet. In many cases this is due to the wearing of shoes with thin soles or with poorly-designed arches. Linemen who spend considerable time "in the hooks" should have shoes with extra heavy soles or a

special leather reinforcement on their instep. It should be realized that the entire weight of the body is supported on a narrow surface, scarcely over one inch in width. The heavy shoe sole or special reinforcement will help to distribute this weight over the entire bottom of the foot, rather than have it localized in one place.

In addition to the standard type, special climbers useful to linemen who do considerable tree climbing are available. These climbers have gaffs which are 5½ inches long, measured on the outside, and three inches long on the underside. They are set high on the leg iron so that the points clear the ground when walking. This type of climber is much less liable to slip when climbing trees than the short gaff type of climber.

Inasmuch as a lineman's life is often dependent upon his climbers being in good condition, a periodic inspection should be made of the condition of the gaff and the leather straps. In order to avoid danger from a gaff becoming

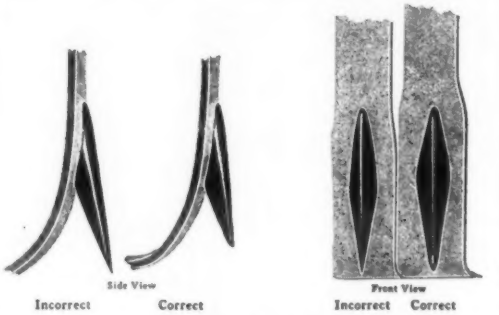


FIG. 2. CORRECTLY AND INCORRECTLY-SHARPENED CLIMBERS

worn so badly that it does not penetrate the pole easily, with resultant danger from slipping, it is necessary to occasionally sharpen the gaff.

Instructions for Sharpening Lineman's Climbers

The following instructions—published by courtesy of Mathias Klein & Sons—represent the best practice in sharpening gaffs on climbers:

1. Always use a sharp file. NEVER grind to a point on any kind of wheel, for you are likely to set up heat which will spoil the temper of the gaff and make it dangerously weak.

2. Set climber in vise with gaff uppermost so that you can file from heel to point of gaff.

3. Remove only sufficient material to obtain a good point.

4. Do not make a needle point but leave a shoulder about ⅛th inch back from the point, and from there work over to the point. At the shoulder you should have a width of approximately 5/32 inch.

5. If necessary to remove any metal from the underside of gaff, be careful not to round off too much towards the point or you may find a tendency to "cut out" when climbing. The under side of the gaff should be left straight for practically its entire length.

By following these simple directions a satisfactory job can be secured.

Fig. 2 illustrates the correct and incorrect methods.

NOTE: Safety engineers recommend that climbers should not be used after the gaffs are worn to 1¼ inches (measured on underside). When climbers reach this condition, they should be regaffed or a new pair obtained.

Miscellaneous Plant Notes—Cable

The following table gives the average time required to complete "straight" cable splices of both the random and the tag type.

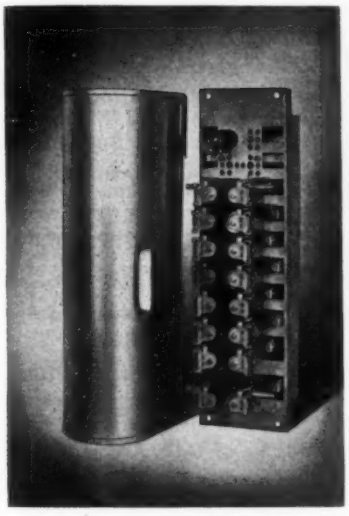
Size of Cable	Splicers' Hours Random	Tag
15 pair	2.0	3.0
25 pair	3.0	3.5
50 pair	3.5	4.5
100 pair	4.0	6.0
150 pair	4.5	8.0
200 pair	6.0	10.0
300 pair	7.5	12 0
400 pair	9.0	16.0
600 pair	12.0	24.0
900 pair	18.0	30.0
1200 pair	27.0	45.0

The Manufacturers' Department

Subscriber Transfer Unit for Business Telephone Users

Announcement has been made by Automatic Electric Co. of the development of a telephone call transfer unit, which is especially adapted to the needs of professional people who have frequent occasion to be away from their regular places of business.

The service provided by the transfer unit permits telephone calls made to the subscriber's regular office number to be automatically transferred to his residence telephone at times when the office is unattended—for example, at night and on Sundays and holidays. It can be used on manual or automatic systems.



Typical Transfer Service Equipment for Four Subscribers.

For each subscriber provided with the transfer feature, a subscriber's transfer unit is installed at the central office and attached to the business line, with jumpers to the residence line. The business telephone is equipped with a switching key. The unit can be used with either automatic central office equipment, or with any manual central battery switchboard having the usual three-wire circuits with line and cut-off relays.

The operation of the service is as follows:

While the business office is attended, the switching key is left in the normal position, all calls to the business number being intercepted at the office. On leaving the office unattended, the subscriber operates the key. Thereafter, all calls to the business number are received at the residence telephone, but without otherwise interfering with the regular residence service.

On returning to his office, the subscriber restores his key, which places the two lines in their original positions. Provision is made so that if an incoming call to the business telephone is being answered at the residence telephone at the time, the transfer unit will not disturb the connection until the conversation has been completed.

The transfer unit consists of a group of four relays, and may be mounted in groups of one to four units on a single mounting base. The base is provided with a terminal block, and provided with facilities for mounting on a wall or M.D.F. Complete details may be obtained from American Automatic Electric Sales Co., Chicago.

▼ ▼

Wallkill, N. Y., Exchange Cut-Over to Dial

The Wallkill, N. Y., exchange of the Walden Telephone Co. was recently cut-over to full dial automatic operation. This exchange, which serves about 300 subscribers in the southern part of Ulster County, is the second of the Walden company's exchanges to be converted to automatic service.

C. Fred Fowler is president of the company; N. F. Glidden, vice-president; Roger Zanes, secretary; and H. R. Miller, of Walden, is general manager in charge of operations.

The new equipment is a North All-Relay dial automatic switchboard of the CX-100 type and is said to possess all of the latest North features such as line lockout, complete reverting call service on every line and time disconnect on local conversations.

▼ ▼

Cook Has Warehouse Stock at Dallas, Texas

To provide faster service to its many customers throughout the Southwest, the Cook Electric Co., Chicago, Ill., has placed a stock of pole cable terminals, substation protectors and lightning arresters at Pearl and Corinth Streets, Dallas, Texas. The telephone number is 4-0935.

More Hours of Service

. . . that's what every telephone engineer seeks . . . *more hours of service* . . . which means fewer replacements, lower service costs! And that's exactly what Ray-O-Vac telephone batteries offer!

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Rules Against Uniform Accounting System

THE New York Public Service Commission on May 19 lost its appeal to the New York Court of Appeals to enforce an order requiring public utility companies to segregate their capital accounts to show the original cost of properties and to set up straight-line depreciation; also to charge against surplus the price paid for properties over the original cost to the first builder.

The principles involved in this case are of interest to the telephone field because of the FCC uniform system of accounting order, an appeal from which is now on its way to the United States Supreme Court. In this system some of the same points are included which have been ruled against by the New York high court.

The commission contended that it had the power to prescribe accounting regulations for utilities and that it was not necessary to grant a public hearing to the utilities to contest any such rulings. The court decided that the utilities were entitled to such hearings and further that any rulings developing from such hearings could be brought for review before the state courts.

The New York high court, in the opinion it gave on May 19, declared:

"We agree with the Appellate Division in its construction of the order of the New York Public Service Commission. On that construction the orders were more than general administrative or legislative rules. They directly interfered with private property rights of the respondents.

Such an order may be made only after a hearing and, since it involves a judicial act, is subject to review on certiorari.

Nothing here decided limits the power of the commission to prescribe uniform methods of keeping accounts, records and books. (Public Service Law, Sec. 66, Subd. 4). Under that power all the information here sought could have been elicited from the respondents by directions of the commission that would have been open to none of the objections to its present orders.

The order of the Appellate Division should be affirmed without costs. The first question certified is answered in the affirmative and the others in the negative."

The question certified was whether a certiorari would lie. The court held that it did.

Thirty-eight public utilities—electric, water and gas—joined the New York Edison Co. in making the appeal from the commission's ruling.

The Appellate Division, Third Depart-

(*Concluded on page* 38)

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Buyer's Weekly Guide

A list of firms and companies offering equipment, supplies or services for operating telephone companies

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Burroughs Adding Machine Company, Second Blvd., Detroit, Mich. — Adding, Bookkeeping, Calculating, Billing and Accounting Machines, Electric Carriage Typewriters, Standard Typewriters, Operator Correct-Posture Chairs. Burroughs machines are in use today in hundreds of progressive telephone companies throughout the country.

BATTERIES—DRY CELLS

Burgess Battery Co., Freeport, Ill.—Burgess Flashlights and Uni-Cel Flashlight Batteries—for dependability and service. The Burgess Twin-Six Telephone Battery—a 2-volt unit designed to replace two No. 6 cells, with longer life, lighter weight, smaller size and a leakproof case. The Burgess Little-Six—replaces the old type No. 6 cell, is smaller and lighter, will not ooze or bulge, has all the electrical capacity of the standard No. 6 cell.

National Carbon Company, 30 E. 42nd St., New York.—"Columbia" Telephone Dry Batteries; "Eveready" Flashlights, Flashlight Batteries and Long Life Dry Cells, "National Pyramid" brushes, carbon, graphite and metal graphite for motors, generators and rotary converters. "Eveready" Prestone anti-freeze; "Eveready" Rustone rust preventive; and "Eveready" Air Cell telephone operators' transmitter batteries.

BATTERIES—STORAGE

The Electric Storage Battery Company, Allegheny Ave. and 19th St., Philadelphia, Pa.—Exide Storage Batteries. Branches: Boston, New York, Rochester, Philadelphia, Pittsburgh, Washington, Atlanta, Cincinnati, Cleveland, Detroit, Chicago, Kansas City, Minneapolis, St. Louis, Denver, San Francisco and Seattle.

Philco (Battery Division) Tioga and C Streets, Philadelphia, Pa.—Philco Flote in Steel-Glass Storage Batteries for P. B. X. and central office operation. Your old batteries will command a liberal allowance toward any Flote in Steel-Glass Cell from 10 A.H. to 1056 A.H. Write now for catalog ...it will tell you the complete story of Flote in Steel-Glass—the finest of telephone batteries.

BATTERY CHARGING EQUIPMENT

General Electric Company, Bridgeport, Conn.—Tungar battery chargers. G-E pole line hardware. Cable filling compound.

North Electric Mfg. Co., Galion, Ohio. — Self-regulating battery chargers.

CABLE—LEAD ENCASED

Kennecott Wire and Cable Company, Subsidiary of Kennecott Copper Corporation (formerly American Electrical Works) Philipsdale, R. I.—Paper telephone cable, switchboard cable, bare copper wire. Chicago Office: 20 N. Wacker Drive; Cincinnati: Traction Bldg.; New York: 100 E. 42nd St.

British Insulated Cables, Ltd., Surrey House, Embankment, W. C. 2, Factory: Prescot, Lancashire, England.—Telephone cable of all sizes and capacities.

General Cable Corporation, 420 Lexington Ave., New York, N. Y.—Paper telephone cables of standardized manufacture for over forty years. Weatherproof and insulated copperweld drop wire.

Eugene F. Phillips Electrical Works, Ltd., Montreal, Can.—For any type of wire or cable used in telephone, telegraph or power work get in touch with "Phillips." Manufacturers of bare and insulated copper wires, rubber insulated wires, enameled wire, magnet wire, telephone cables, power cables, switchboard cables, flexible cords, copper rods, etc.

CABLE RINGS

National Telephone Supply Company, 5100 Superior Ave., Cleveland, Ohio.—National Cable Rings, National Splicing Sleeves, Non-Breakable Messenger Cable Hangers, Marlin and Swisher Cable Hangers and Custom Galvanizers. National cable rings are practical because they are two-way,—they allow the cable to be pulled in either direction. National sleeves make secure the weakest points in the line. If it's a splice—make it a National.

CABLE TERMINALS

Cook Electric Company, 2700 Southport Ave., Chicago, Ill.—Protective Pole Cable Terminals, Unprotected Pole Cable Terminals, central office protection, lighting arresters, sleeves, fuses.

Reliable Electric Company, 3148 Carroll Ave., Chicago, Ill.—Complete line of cable terminals, telephone and switchboard protectors, sleeves, fuses, solderless wire connectors and specialties.

CORDS, CABLE AND WIRE

Lenz Electric Manufacturing Co., 1751 N. Western Ave., Chicago—Established 1904—telephone and switchboard cords for all makes of equipment, braided and lead-covered telephone cable, flame-proof jumper wire, interior telephone wire, switchboard wire.

CORDS AND WIRE

Runzel Cord & Wire Co., 4727-31 Montrose Ave., Chicago—Telephone and Switchboard Cords, Flame-proof Jumper Wire, Switchboard Wire, Interior Telephone Wire. W. L. Runzel, President, has devoted over 40 years to the making of fine telephone cords.

ELAPSED TIME RECORDERS

Calculagraph Company, 50 Church St., New York, N. Y.—Calculagraph is the world's standard elapsed time recorder and gives you toll records printed with elapsed time to the second. Both spring driven and electric motor models are available.

POLES

B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

International Creosoting and Construction Company, Galveston, Texas—Creosoted Southern Yellow Pine Poles. Plants: Beaumont and Texarkana, Texas.

Jordan Bros. Lumber Co., Box 84, Norfolk, Va.—Virginia White Cedar Poles. Plain or charred and creo-treated butts.

MacGillis & Gibbs Company, Milwaukee, Wis.—Northern White and Western Red Cedar Poles. Plain or butt-treated. Immediate quotations on request.

Michigan Pole & Tie Company, Newberry and Grand Rapids, Mich. — "Poles with Character." Northern White and Western Red Cedar. Strategically located yards, Minneapolis, Minn., and Reed City (Lower Michigan), insure quick deliveries.

H. Sigalet & Company, Ltd., Lumby, B. C., Canada — Western Red Cedar Poles. Plain or Butt treated.

Valentine Clark Corporation, 2516 Doswell Ave., St. Paul, Minn.—Finished Cedar Poles. Plain or Butt treated.

SUPPLIES, SWITCHBOARDS AND INSTRUMENTS

American Automatic Electric Sales Company, 1033 West Van Buren Street, Chicago, Ill.—Public Automatic Telephone Systems, Private Automatic Telephone Systems, Central Battery and Magneto Manual Telephone Switchboards, Remote Control Switchboards, Telephone Instruments of all types, Battery Eliminators, Charging Equipment, Signaling and Control Apparatus, Cords, Wires, Cables, Monotype Copperweld Drop Wire, and a complete line of construction materials and supplies.

Automatic Electric Company, 1033 W. Van Buren St., Chicago, Ill.—Public Automatic Dial Systems, Private Automatic Dial Systems, Telephones, relays, signalling and control equipment.

Automatic Electric Company, Ltd., Milton Road, Edge Lane, Liverpool, England.—Automatic Telephone Equipment.

Automatic Electric Sales Company, Ltd., 1027 W. Van Buren St., Chicago, Ill.—Public Automatic Dial Systems, Private Automatic Dial Systems, Manual Telephone Equipment, telephones, storage batteries, wire, cable, poles, etc.

Kellogg Switchboard & Supply Company, Adams & Aberdeen Sts., Chicago, Ill.—Engineers and designers, manufacturers and suppliers of complete equipment for telephone exchanges and communication systems. Manufacturers of "Master-built" Common Battery, Magneto and PBX Switchboards, "Masterphone" Telephone Instruments, and a complete line of telephone supplies, including bronze drop and interior wire.

North Electric Manufacturing Company, Galion, Ohio—Machine switching telephone systems. Automanual and Automatic. "All-Relay" Switching Apparatus (Dialless and Dial Control). Unattended Satellite Systems. Dials (automatic).

Siemens Brothers & Company, Ltd., Woolwich, England—Automatic and Manual Telephone Equipment.

Stromberg-Carlson Telephone Manufacturing Company, 100 Carlson Road, Rochester, N. Y. — Telephone apparatus of all kinds, switchboard cords, cable and general telephone supplies.

TOOLS

Crescent Tool Co., Jamestown, N. Y.—CRESTOLOY Pliers, Curved Needle Nose Pliers, Heavy Diagonal Cutting Pliers, Linemen's Side Cutting Pliers, End Cutting Nippers, Crescent Hack Saws.

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We operate the largest printing plant in the world devoted exclusively to telephone printing. We have standard forms in stock covering every phase of telephone accounting and office records. We can do your telephone printing better because we know the telephone business.

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One of the finest lot of telephones we have ever been privileged to sell. Every part in A-1 condition.

W.E. No. 1317 Wall Phones—5 Bar—No. 48 Generator—1600 No. 38 Ringers. Condenser in Rec. Circuit. Orginal Cabinet $12.00

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Telephone Repair Shop
Rogers Park Station Chicago
Owned and Managed by Dan'l H. McNulty

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Crawford Telephone & Telegraph Company, C. J. York, Sec.-Treas., Girard, Kansas

New Style Stewart Test Sets
Have detector coil for telling direction and lamp for telling distance to trouble. Sent on trial. Price
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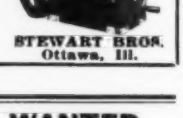

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ATTENTION telephone company executives! Here is a qualified young telephone man, age 31, with excellent connections and references. He has had exceptional training and experience with Independent companies, traffic, commercial and central office management. Desires to make a change to a company appreciating competence and loyalty. Address 8529, care of TELEPHONY.

(*Concluded from page* 36)

ment, previously had denied the commission's right to enforce a uniform method of accounting and had sent the matter back to the commission (TELEPHONY of July 20, 1935.)

The justices had held, in effect, that the commission did not have the power to require companies to show in their books the "original cost" of property acquired from predecessor utilities, in the manner set forth in the uniform system of keeping accounts, and that the requirements would involve confiscation of a portion of the property of the utilities.

The appellate court in its decision, which the higher court upheld, also had ruled that the commission lacked the power to adopt the "straight-line" system of depreciation for accounting purposes and that the uniform accounting system under review, insofar as it related to utilities setting up depreciation on a "straight-line" method, was ultra vires. This tribunal had found, moreover, that the commission's orders were confiscatory insofar as they required "capital stock expense" to be charged off from surplus.

The commission's orders requiring expenses incurred in the regulation of the utility to be placed in a "suspense" account and not charged to operating expenses until so directed by the commission constituted an unwarranted assumption of authority and was illegal, the appellate division had ruled.

▼ ▼

Bell System Opens Service to Jamaica

Radio-telephone conversations between New York City and the city of Kingston, on the island of Jamaica, in early April marked further extension of Bell System overseas service to the West Indies. Short wave radio-telephone stations of the Bell System at Miami, working with stations of the Direct West Indies Cable Co. at Kingston, bridged the ocean between Jamaica and the mainland. At Miami the connection with New York was made over long distance telephone wire lines and cables.

Those participating in the ceremonies at the New York end were Sir Gerald Campbell, British consul general; Richard W. Lawrence, chairman of executive committee of the New York Chamber of Commerce; T. G. Miller, vice-president, A. T. & T. Co., in charge of the Long Lines Department.

At Kingston: Sir Edward Brandis Denham, governor of Jamaica; George Armstrong, United States consul; Ellis Levy, president, Jamaica Chamber of Commerce; Lewis Ashenheim, chairman, Jamaica Telephone Co.; A. G. Blackwell, manager, Direct West Indies Cable Co.